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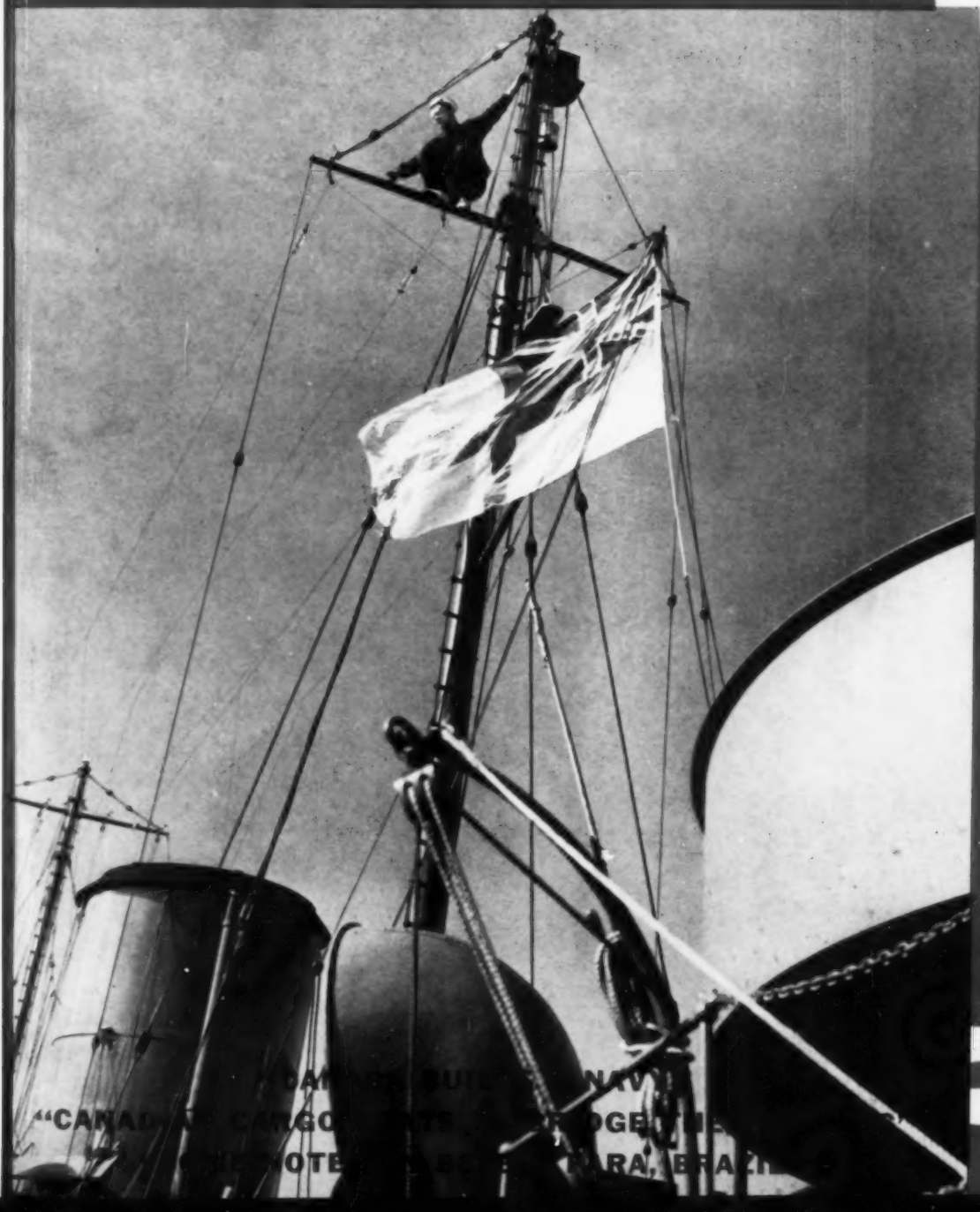

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CANADIAN GEOGRAPHICAL JOURNAL

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Editor – *Gordon M. Dallyn*

This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustrations, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth, and other parts of the world in which Canada has special interest.

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The articles in this Journal are indexed in the *Reader's Guide to Periodical Literature* which may be found in any public library.

The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1936.

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The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography—historical, physical and economic—first of Canada, then of the British Empire and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated and educational to the young, as well as informative to the adult.

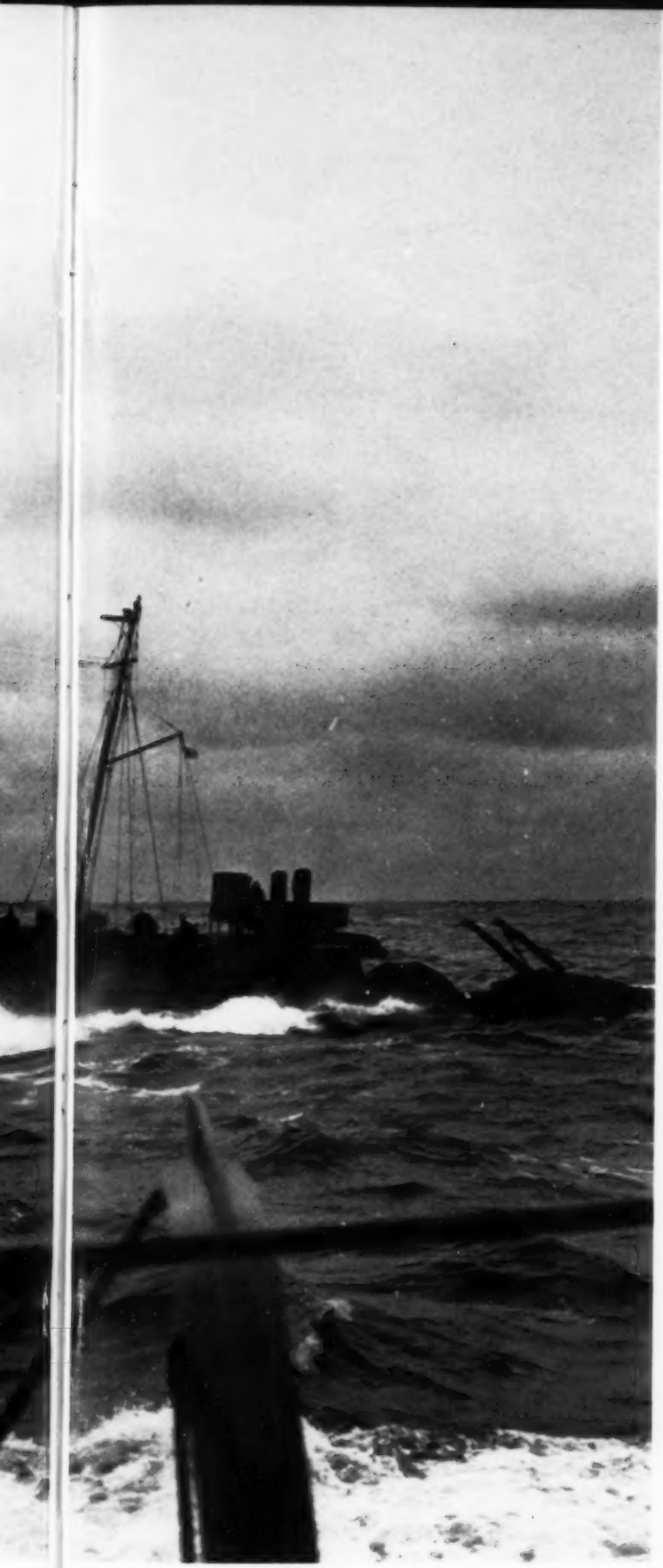
The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is three dollars in Canada.

The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.

From Victory unto Victory - - - -

The Victory "V" at the Head Office of the Bank of Montreal was not premeditated but the setting is perfect. The two strips of matting form the "V", and centred in the "V" appears the figure of "Victory", the Bank's memorial to the men who fell in the Great War, 1914-1918. The present year marks the 125th anniversary of the foundation of the Bank which has occupied a foremost place in the life of Canada through every phase of its growth to nationhood.

A Corvette on convoy duty: "Extremely seaworthy and easy to manoeuvre" say their officers.



"Canada Builds A Navy"

by **DESMOND A. CLARKE***

WHEN the storm broke on September third, 1939, the British Admiralty signalled the Dominion of Canada "When can convoys be started?" Promptly the Royal Canadian Navy broke out the signal "Immediately".

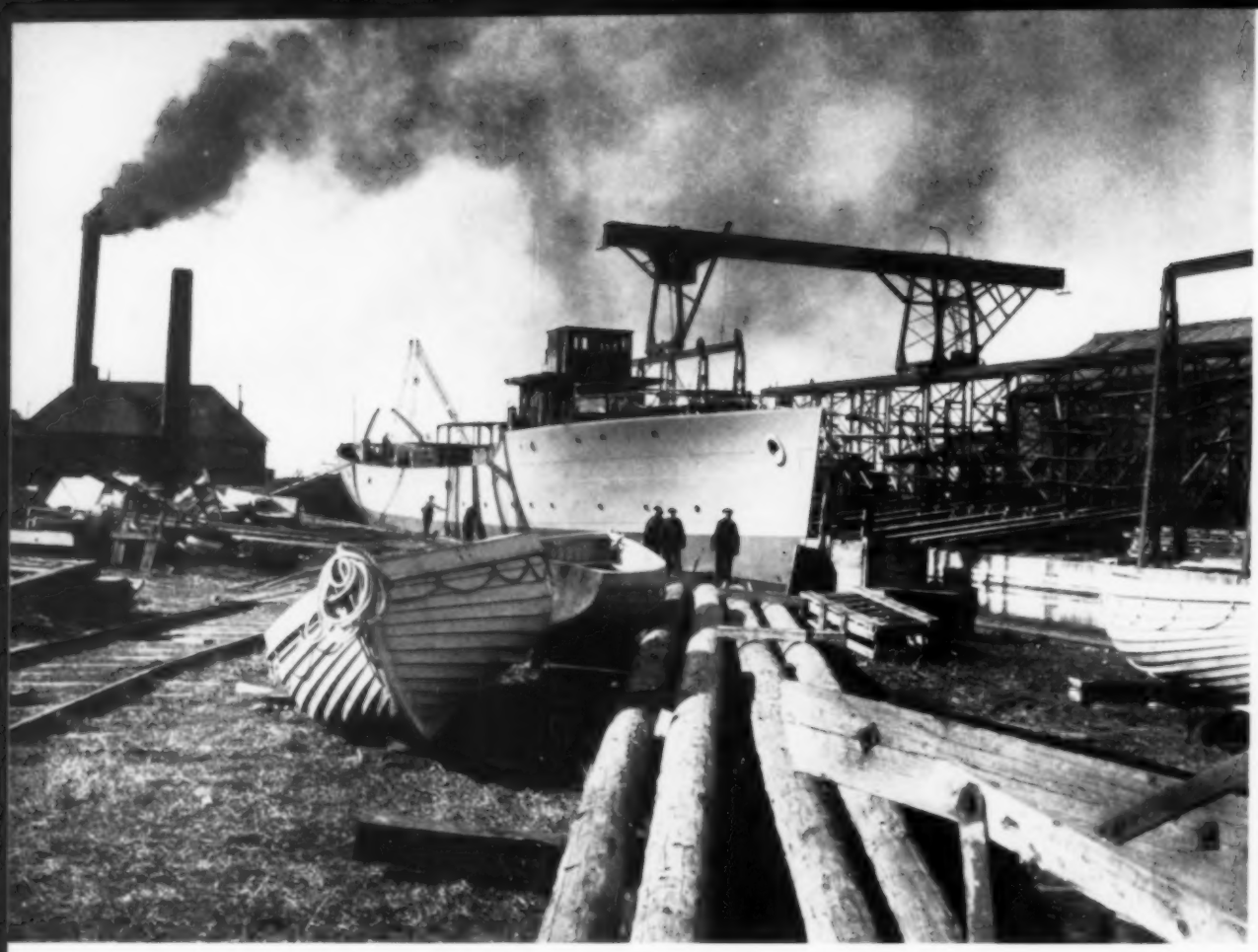
Six days after Canada declared war on the Reich, the first convoy of eighteen ships sailed for Britain and reached its destination in safety. From that day to this the Royal Canadian Navy, in co-operation with the Royal Navy, has convoyed more than 42,500,000 tons of cargo to the British Isles.

The Navy has also patrolled the high seas from Greenland to the Caribbean, has aided in protecting shipping around the British Isles, has co-operated with the parent fleet in hunting down surface raiders, has aided in minesweeping and other duties, and to-day is driving U-boats from our own coasts and fighting the Hun in our home waters. Men and ships have won distinction in action and proved themselves worthy of the best traditions of the senior service.

But when, on the outbreak of war, the "Immediately" signal was flashed across the ocean, Canada's Navy, a youngster whose growth had been stunted by the disarmament policies of peace-loving nations, was little more than a token force consisting of 1,744 officers and men on active strength and fifteen ships. Most of these fifteen ships had been built in Great Britain.

***Director General of the Shipbuilding Branch, Department of Munitions and Supply**

Photographs where not otherwise designated courtesy of Public Information and Royal Canadian Navy



A corvette rides high as it is being fitted out after a side launching.

To-day, Canada's Navy includes about 30,000 men on active service and approximately 350 ships including corvettes, minesweepers, patrol boats and small craft. Every one of the new ships has been built here in Canada by Canadian workmen and from 95 per cent Canadian materials. In addition, Canada is turning out nearly a thousand small craft of various types to supply the requirements of the British and Canadian Army, Navy and Air Force; is building ships for the British Navy and the Royal Netherland's Navy, and is embarking on the construction of large size naval units—destroyers of the Tribal class.

The Dominion's shipbuilding programme is constantly being expanded, and to-day orders placed for ships now exceed the $500,000,000 mark.

You may ask, what did Canada know of shipbuilding when she undertook this considerable programme which involves 17 major shipyards and 60 smaller ones, as well as 150 engineering shops and 350 industries, large and small, across Canada? What facilities had she on hand for the job?

Actually, at the time when war broke out shipbuilding in the Dominion was a starved industry. An impetus had been given to ship construction during the last war when shipyards were established on the east and west coasts; 164,674 tons of shipping were built in 1920, the peak production year, but the industry had not survived the lean years of the depression. In 1932 Canada built five ships totalling 2,123 tons; in 1933 two ships totalling 619 tons; in 1934 three ships totalling 862 tons. As a result personnel had moved to more active industries and a general business paralysis had affected the entire set-up.

Note that corvettes are named after Canadian cities and towns. These three link the foothills, the prairies, and the Maritimes.

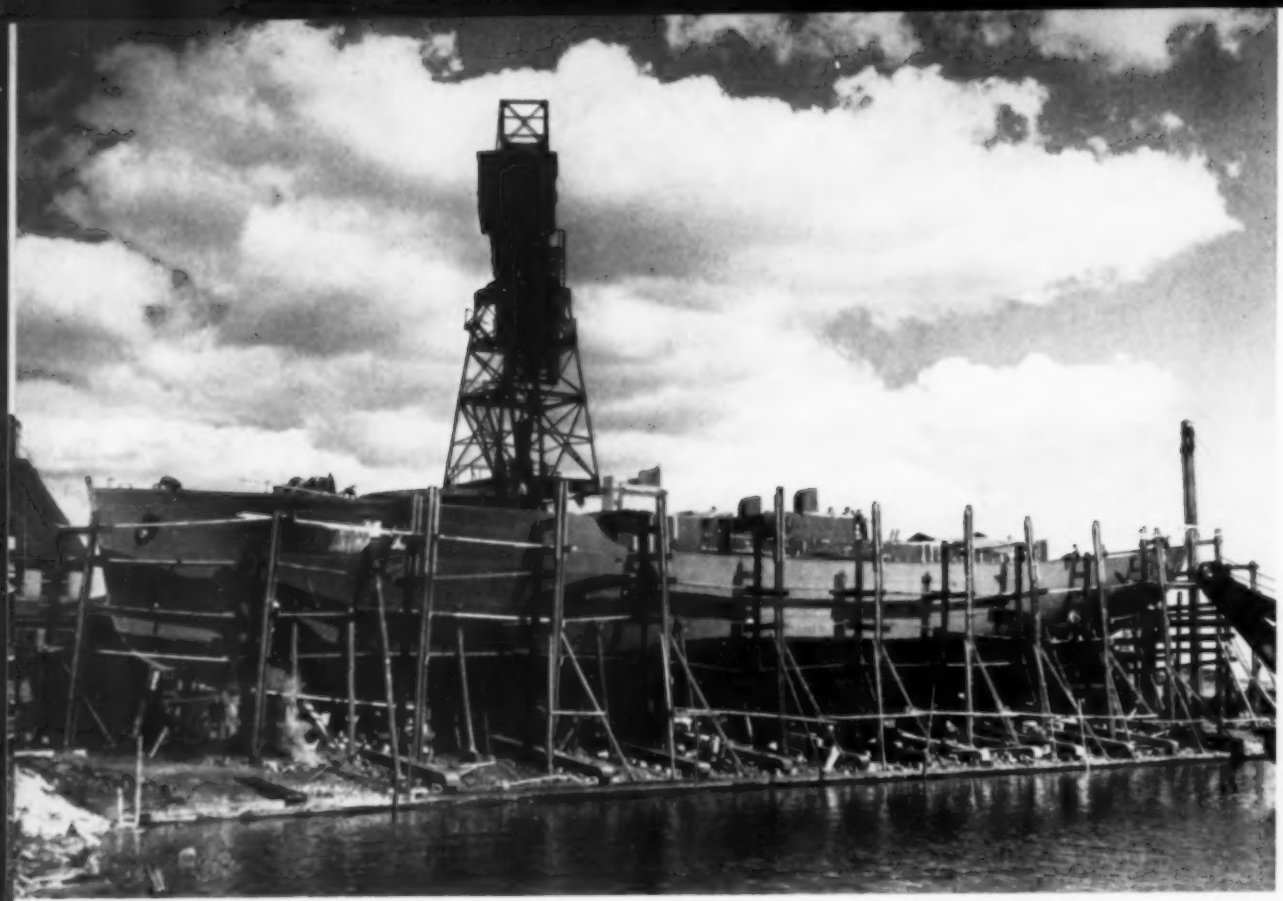
In fact, Great Britain viewed with some doubt the possibilities of Canada contributing in any major way to an essential war time ship construction programme; there did not appear to be technicians available, component parts, or even suitable labour. The Canadian shipbuilders, however, impressed the British authorities with their vigour, initiative and determination to help defeat the impending German U-boat onslaught. Finally, with the Old Country's blessing, they were embarked on a large scale contribution to the common cause. The story of how the shipyards of the Dominion are succeeding in their objective has only been partly told. These pages are designed to put on record something of the substantial achievement of Canadian shipbuilders.

A Seafaring Past

Although Canadians were not building ships on any sizable scale in 1939, the Dominion had a seafaring past. In the days of wooden ships and especially during the half century from 1840 to 1890, Canada owned and operated a vast fleet of merchant ships, and had captured a lion's share of the world's carrying trade.

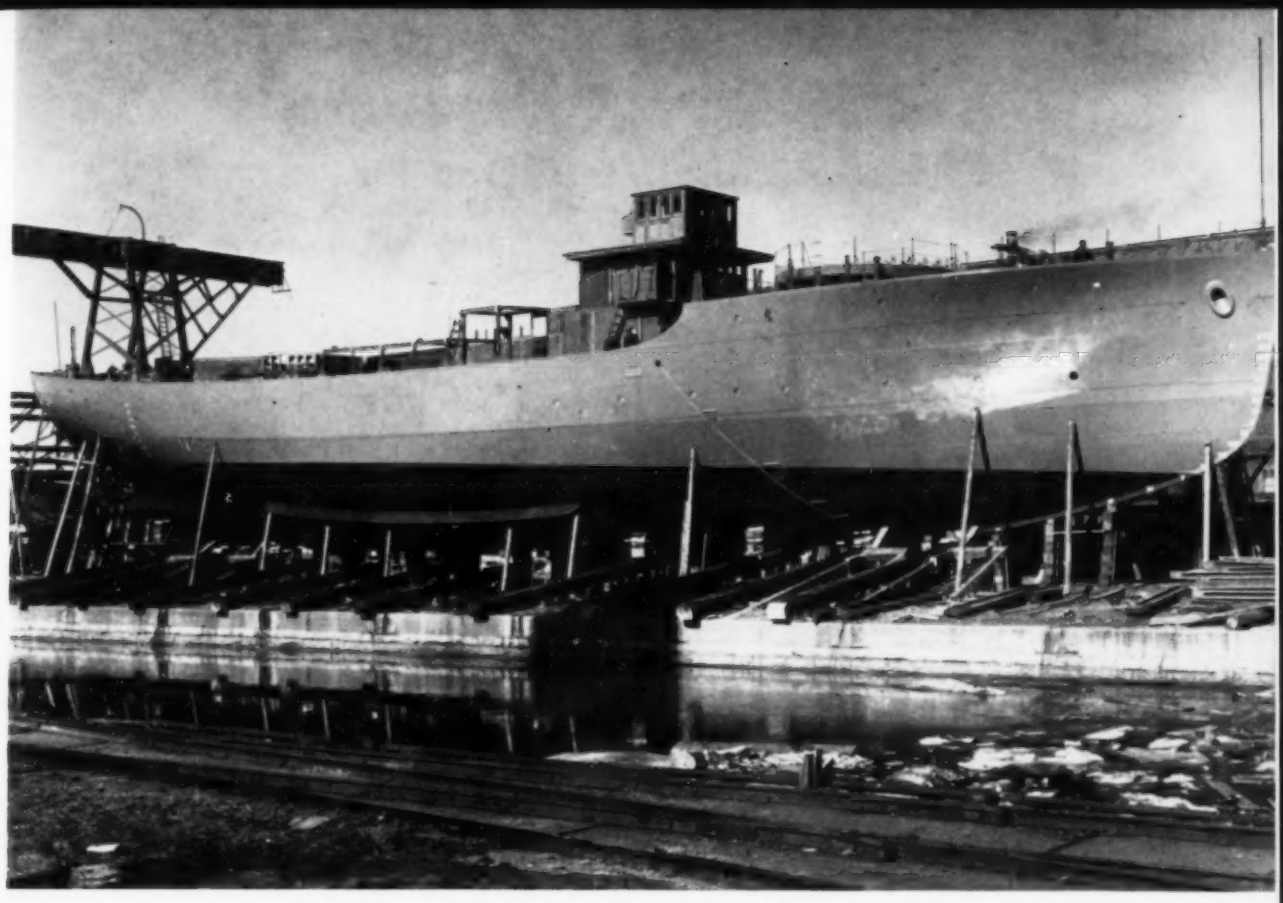
In 1878, she ranked fourth among the ship-owning countries of the world, with 7,196 vessels aggregating 1,333,105 tons. Many of the coastal towns and cities of Canada were established during the era of clipper ships.

From the earliest days of New France, shipbuilding flourished in the colony; the first vessels to be launched in Canada, being built at Port Royal, in 1606. In 1739, a considerable programme of war vessels for the French Navy was undertaken by Quebec shipyards, the iron work, guns and projectiles being cast at a Cana-



An almost-completed hull of a corvette as seen from the launching basin of an Ontario shipyard.

Getting ready to launch a corvette.



There is much corvette building along the Great Lakes. This one is about ready to slip sideways into the water.

dian forge. The first corvette to be launched in Canada was not a part of our present programme as you might think, but a 500-ton vessel contracted for by Nérée Levasseur, builder for the King, and launched at Quebec in 1739.

In the days of sailing ships, a corvette was a sloop of war. It ranked next below a frigate, and while usually carrying only one tier of guns, it was fast sailing and easy to manoeuvre, two characteristics which mark the corvette of World War II.

Under the British regime Quebec's fame as a shipbuilding centre increased, and so skilful was the Quebec ship carpenter that it was said that he could split a playing card edgewise with his adze.

In the latter half of the nineteenth century the Maritime Provinces had built up a reputation for smart ships and native-born seamen[1].

But the supremacy which the great timber forests of North America gave to Canadians in the building of wooden ships was lost with the coming of iron and steel hulls and the age of steam; although it may be worthy of note that the first steamship to cross the Atlantic under steam alone was the *Royal William* which was built at Quebec.

This early success, however, was only a carry-over of former glories, for the construction of iron and steel ships in Canada, up to date, has never approached the proportions of the days of sail. But now with shipyards opening up across the Dominion, the building programme occupies well over 40,000 men in the yards themselves, while about as many again are engaged in factories manufacturing components. This number will be substantially increased this year. Some of these men were originally shipbuilders by trade and glad to return to their original

[1]Frederick William Wallace "*Wooden Ships and Iron Men*".

The Finished pro-
duct — and on the
job

calling, more have been trained on the spot, but many have the blood of shipwrights and sailors in their veins. With the new shipbuilding programme, Canada comes into her own again as a sea power.

When the Shipbuilding Branch of the Department of Munitions and Supply was established, its personnel was recruited from all sections of industry—and I would like to pay tribute to the many different companies throughout Canada, oil, paper, steel, construction, shipping and other organizations—who have so generously contributed of their manpower, to help us in our undertaking.

The present construction programme falls into four parts, all coming under the direction of the Honourable C. D. Howe, Minister of Munitions and Supply. The first two divisions of projected construction involving steel and wooden fighting ships envisage the continuous expansion of Canada's Navy and are under the Director General of Shipbuilding for Canada and constitute the scope of this article.

The third division of Canada's ship construction programme, cargo vessel building, is the responsibility of Wartime Merchant Shipping Limited, while the repair programme is administered by a Controller of Ship Repairs. A separate article in this issue deals with these important branches of Canada's shipbuilding industry.

Corvette Building

The first step in the naval programme was taken at the instance of Vice Admiral Percy Nelles, Chief-of-Staff of Naval Services whose "Immediately" signal had been based on his confidence in the resources of Canada and in the spirit of the Canadian people. Vice Admiral Nelles at once set out to get more ships for Canada's Navy as fast as ships could be obtained. His foresight in inaugurating the naval programme gained Canada many precious days — when the "phoney" war delusion persisted in many quarters.

The construction of corvettes was undertaken without delay and is undoubtedly the most important section of the naval shipbuilding programme. It is Canada's answer to Germany's submarine campaign — and a very effective answer it has proved. Canada's shipyards practically dormant for many years rallied to the call, and in a short time were buzzing with the activity of corvette building. At the same time the Navy started training officers and men to man these new fighting ships which have proven such an asset in the Battle of the Atlantic.

Building a corvette, however, despite its small size is no child's play. These war wasps are complicated in design and packed with equipment. It requires approximately 375,000 man-hours of labour to build and outfit one of these ships and on account of the large quantity of equipment aboard each vessel and the small space in which to store it, the building of corvettes requires much planning and skill.

As Canada's shipyards, at the outset or war, were not equipped to carry out such naval construction, some time was required for preliminary tooling up. But so quickly was this part of the job dispatched that Canada was in a position to turn out one corvette every four days during the navigating season of 1941.

The Navy decided to name these corvettes after Canadian cities and towns, so that each part of Canada would be represented at sea. Many cities of each province are honoured by corvettes bearing their name, and I am very glad to state that these cities and towns in turn have done their part and expressed in a practical way their interest in their namesake corvettes by contributing radios, silverware, and other comforts to make these vessels more homelike for the fighting men of the Canadian Navy who man them.

The efficiency of these warships in miniature is well known. From their inception they have been designed for

SURELY THE MOST THRILLING MOMENT . . .

SHIPS ARE LAUNCHED END-ON OR SIDEWISE AS ILLUSTRATED ABOVE. NO MATTER WHAT THEIR SIZE IT IS A DELICATE JOB.

. . . IS WHEN THE HULL KISSES THE WATER!

Top left:—A minesweeper backs gently down the ways while whistles blow and workmen cheer. Lower left:—Getting ready to launch a corvette out on the West Coast. Note the sailor preparing the bottle of "champagne." Top right:—Side launching is a tricky operation. Huge chains are fastened to the hull to prevent the boat from dashing itself against the other side of the fitting basin. Lower right:—A West Coast corvette goes down the ways.

Wooden ship construction on the West Coast includes sturdy patrol boats. Careful hand work is required.

convoy and patrol work. They are fast enough for deadly attack upon enemy submarines, and they have a cruising range which permits them to stay at sea for long periods. Their armament includes defensive guns heavy enough to engage any submarine which dares come to the surface, and high-angle guns of great firing intensity with which to ward off enemy planes; while offensively they are equipped with depth charges, which makes them effective against submarines.

Officers on corvettes tell us that though the ships have "a terrific roll", they are "extremely seaworthy and easy to manoeuvre". The general report is: "A corvette rides a storm like a duck on water, decks, although on the side, are practically always awash. Corvettes do not break under stress of wind and weather." These are merited tributes to Canada's shipyards and to Canada's shipbuilders. As the corvettes slide off the ways and later sail out of the fitting-out basins, every worker feels a glow of pride in a war job well done.

Other Types

The Shipbuilding Branch of the Department of Munitions and Supply is also responsible for the several types of minesweepers for the Royal Canadian Navy. The three main types are made of steel while the others are built of wood. The steel ones resemble corvettes, and the casual observer has difficulty in telling the two types apart. Minesweepers are not limited to the duty their name implies; they are fitted to undertake sea jobs other than the clearing of enemy mines from the sea areas they guard.

In both naval and cargo shipbuilding, the work is further speeded by launching

Long-jawed vises hold a plank in place while a workman with an electric-powered tool speeds production.

hulls as soon as possible and fitting them while afloat. Engines, boilers, guns, depth-charge throwers, the huge windlass aft for sweeping operations, miles of electric wiring, tubing, pipe-fitting, living quarters, steering gear, auxiliary machinery secret devices — all these have to be installed.

Tribal Destroyers

Besides the corvettes and minesweepers, Canadian shipyards are in the process of building a large type of fighting vessel. These are destroyers of the Tribal class. Keels will shortly be laid in Halifax and work is progressing at a satisfactory speed. Three of these destroyers have been launched from British shipyards. Tribal destroyers are major fighting ships and the addition of these to Canada's Navy will step up her fighting power to a noticeable degree.

The Tribal class destroyers fight like light cruisers. They are 1,870 tons and require a crew of 190 men. They have eight 4.7-inch guns, four torpedo tubes, seven smaller guns and are highly manoeuvrable in battle.

Wooden Craft

Wooden craft in large numbers are being built for Canada's three armed services, the Navy, the Army, and the Air Force. Over sixty of the smaller shipyards located on the East and West coasts and the Great Lakes are engaged in the production of motor-torpedo boats, and mosquito fleets of fast subchasers ranging from 75 feet to 112 feet in length, and scores of other types including: Gate vessels, Cape Island boats, pinnaces, water scows, motor launches, aircraft tenders, plywood dories, practice targets, ammunition lighters, provision lighters, crash boats, bomb-loading dinghies, diesel launches, pulling boats,

Among the graceful naval boats are the large motor launches, used for patrol work in coastal waters. Knees being fitted to frame.

Workman rabbiting stem piece of a motor launch for graving plate.

Copper rivets hold the wooden timbers of the motor launches in place.

The sheathed-in prow of a motor launch. Note the graving plate in position just behind the end of the roll of blue prints.

V-251

M-232

Top left:—Fitting basin of a Quebec Motor-Torpedo Boat factory. Lower left:—R.C.A.F. crash boat in full action. Above:—A Fairmile ready for the sea. These are speedy wooden patrol boats, and are effective against submarines.

A flotilla of four 70-foot Motor Torpedo Boats

Western Canadian woods go to sea in the form of speedy sub-chasers
materials. The two Fairmiles in the foreground and the Seine Packers

roar along an Eastern Canada waterfront.

and sturdy patrol boats — an example of 95 per cent Canadian in the rear are in the final stages of outfitting at a West Coast shipyard.

Desmond A. Clarke, Director General of the Shipbuilding Branch, Department of Munitions and Supply.

service boats, cutters, rescue launches, wood skids, rowboats, supply and salvage boats, armoured target boats, motor-torpedo boats, battle practice targets, diesel target towingboats, whalers, towing targets, derrick scows, refuelling scows, lifeboats, collapsible assault boats, motor vessels, special minesweepers, drop-keel dinghies, general unity harbour tugs, skiffs and harbour patrol craft. The total is nearly 1,000 boats. A fair armada.

Although all this Naval Programme, both steel and wood construction comes under the direction of the Shipbuilding Branch, the actual design, inspection and supervision of the construction are looked after by the Navy. For the British Admiralty this is carried out by the British Admiralty Technical Mission headed by Vice Admiral A. E. Evans, R.N., who is assisted by Engineer Rear Admiral H. A. Sheridan, C.B., R.N., Construction Captain A. G. W. Stantan, R.N., and Engineer Captain W. C. Horton, R.N.; and for the Canadian Navy by Engineer Captain G. L. Stephens, R.C.N., Construction Captain A. N. Harrison, R.C.N., and Captain (E) A. C. M. Davy, R.C.N. Seasoned and skilled supervision and competent staff work, ensure that Canadian-built fighting ships are ready for the men of the Navy.

A Naval Inspector deep in the hold sees that ship construction meets the requirements of the R. C. N.

M. T. B.'s

Some of the boats on this programme are of special interest, take, for example, the now-famous motor-torpedo boats — or MTB's, as they are popularly called.

The type of MTB's building in Canada were created by Hubert Scott-Paine, famous English flying boat and motor boat designer and their construction is a war-time secret. These craft are built in a plant covering an area of 130,000 square feet. Visitors are impressed by the atmosphere of streamlined efficiency, of skill and despatch, of conservation of precious time and energy. It is a new development in the ancient craft of shipbuilding. Within sight of downtown Montreal, men and women workers turn out sleek, speedy, powerful, 30-ton motor-torpedo craft for the Navy and the Royal Netherlands Navy, mercy-laden 70-foot rescue vessels, and massive armoured marine target boats for the Royal Canadian Air Force.

With the exception of armament, engines, and fittings, these trim vessels of war are constructed entirely of wood. Despite its heavy nature, teak, imported from Thailand, is used almost exclusively for decking. Bottoms of vessels built for the Royal Netherlands Navy, for use in the Dutch East Indies, were also constructed of teak to discourage the destructive propensities of tropical worms. It is gratifying that the fine record of the Netherlands Navy, in the various recent sea battles against the invading Japanese, was due partly to the use of this very type of fast and powerful, albeit small, sea fighter.

The bulk of a motor-torpedo boat is mahogany, imported from British Honduras. Native British Columbia spruce provides for most of the balance, while small quantities of elm from Ontario are used for gunwhales, chines and ribbons. Cradles are constructed of British Columbia fir or pine, while B.C. cedar lines the insides of the R.C.A.F. rescue tenders. Plywood made from Quebec birch and Ontario maple, and used extensively to lessen weight is manufactured in Vancouver by skilled Czech refugees.

The motor-torpedo craft is equipped with torpedo tubes for offensive duties and anti-aircraft guns, which rotate in raised, power-operated turrets, for defensive purposes. The vessel is powered with Packard marine engines. The R.C.A.F. rescue ships are similar in type and construction but have only one turret of anti-aircraft guns. This allows greater capacity for stretchers and hospitalization facilities, for which the vessels are specially equipped.

When an airman is shot down over the English Channel or other body of water, those swift powerful launches dart out from shore or nearby ship and pick up the pilot who has parachuted down and inflated his dinghy. The rescue service is controlled jointly by the Air Ministry and the Admiralty. It has been nicknamed the "Penguin" Service by the R.C.A.F. boys, as the rescue squad members are credited with swimming but not flying. The official name of this combined effort is the Air-Sea Rescue Service. In the early days of the war, the job was done by the Navy. The new control, which took over early in 1941, have been credited with saving many airmen's lives.

Not a few of the boats run by the "Penguins" are made in Canadian shipbuilding plants. The 70-foot rescue launches are graceful in design, swift in action and tough enough to take rough seas.

The foregoing gives some indication of the complexity of the wooden boat programme. In outline, it is as follows:

SMALL BOATS
Ordered.....925
Launched.....475

BUILDING AT:
Prince Rupert, Victoria, New Westminster, Vancouver, Owen Sound, Penetanguishene, Midland, Port Carling, Bracebridge, Orillia, Peterborough, Brockville, Montreal, Quebec, Summerside, Charlottetown, Dartmouth, Liverpool, Shelburne, Weymouth, Braddock, Lower Le Have, Sheet Harbour.

Top left:—Captain G. L. Stephens, R.C.N., Chief of Naval Engineering and Construction.

Centre: — Captain A. N. Harrison, R.C.N., Director of Naval Construction.

Bottom:—Captain A. C. M. Davy, R.C.N., Assistant Chief of Naval Engineering and Construction.

Vice Admiral Percy W. Nelles steps aboard a newly commissioned corvette at Toronto. Following him is the Hon. Angus MacDonald, Minister of National Defence for Naval Service.

Topright:—Vice Admiral A. E. Evans, R.N.

Centre:—Engineer Rear Admiral H. A. Sheridan, C.B., R.N.

Right:—Engineer Captain W. C. Horton, R.N.

A component-part shop machines a connecting rod for a corvette engine.

Girl workers fasten plywood to superstructure of a Motor-Torpedo Boat.

"Bits and Pieces" Plan

A striking development of Canada's munitions programme, brought into being to mobilize the last ounce of Canada's war productive capacity, is known as the "bits and pieces" plan. Contracts call for a tremendous volume of production, and it is inevitable that the large contracts should be placed in large factories supplying component parts. However, in order to increase the speed with which component parts may be brought to shipyards, large plants break down their contracts into smaller contracts and sub-contract these as widely as possible. Thus, Canada's peace-time machine tool capacity for shipbuilding work is utilized fully.

More than 150 engineering shops and 350 industries large and small, spread across Canada, contribute to Canda's shipbuilding programme by producing component parts. Many millions of dollars of work is now being done for shipbuilding by the paper companies, the mining industries, the oil companies and hundreds of small machine shops and garages all over Canada.

In conjunction with the "bits and pieces" plan, there is the actual flow of component parts from makers to shipyards. Early in 1941 it was considered necessary to conduct a detailed survey of the plants which could be employed in contributing components to ship assemblies. At the same time a system was arranged for the control of purchasing and distribution to the shipyards of these various components. It was the purpose of this control to see that the components were manufactured in sufficient number and shipped in time to meet the requirements of the various yards. Time-tables were evolved for the production of all principal components, and the output of each item was supervised by competent engineers. This supervision was conducted on a zone system, with subordinate officers in the principal manufacturing districts. The fact that Canada's shipbuilding programme is so far advanced has been largely due to the effective way in which this plan for components has been worked out and adhered to.

An additional measure in speeding up Canada's shipbuilding programme has been pre-fabrication. Rolling mills and foundries making braces and struts and ribs of vessels often undertake the work of assembling and riveting the individual parts of these sections and sending them to shipyards for inclusion as units. Other pre-fabrication is the construction of such parts as masts, funnels, ventilators, at factories other than those of the shipyards building vessels.

All this vast expansion in shipping was not possible, of course, without like expansion of employment. The solution to the problem of using untrained labour has been standardization and short courses. Under the Training for War Industry Plan, Canada has been divided into regions each with its own director. These regions undertake the training of workers for shipbuilding, among other industries. Classes are conducted "right on the scene" so men can be trained as welders, riveters, reamers, and in any of the other trades connected with shipbuilding.

But men are not alone in this war job of building ships for Democracy. Women and girls are also active in this type of war work. Scores of the lighter mechanical skills have been successfully encompassed by them. "We have learned a lesson concerning labour in this war," says the manager of one shipbuilding plant. "We have learned that girls and young women working together in a shop can attain a greater degree of concentration than an equal number of young men doing the same tasks. We do not attempt to explain this; we only announce it as a fact." The girls in this particular shipyard paint, rivet, make blackout curtains, make oil coolers, make electric connections, fit up electric control boxes (and in some cases actually make the same control boxes), and do sundry other tasks.

This then is the story of Canada's Navy as it is built under the stress of war. All-Canadian ships constructed in Canadian shipyards by Canadian workmen from Canadian materials, to be manned by Canadian seamen. Ships that are playing an ever-increasing part in the Battle of the Atlantic and aiding in maintaining the life-line to Britain, ships whose duties increase with the widening demands of war on two oceans.

We have made a start but we have more, much more to do. So Canadian shipbuilders strive, and will strive ever more strenuously to shoulder their share in the vast naval effort required of the united nations.

Navy Minister Honourable Angus Macdonald has recently stated:

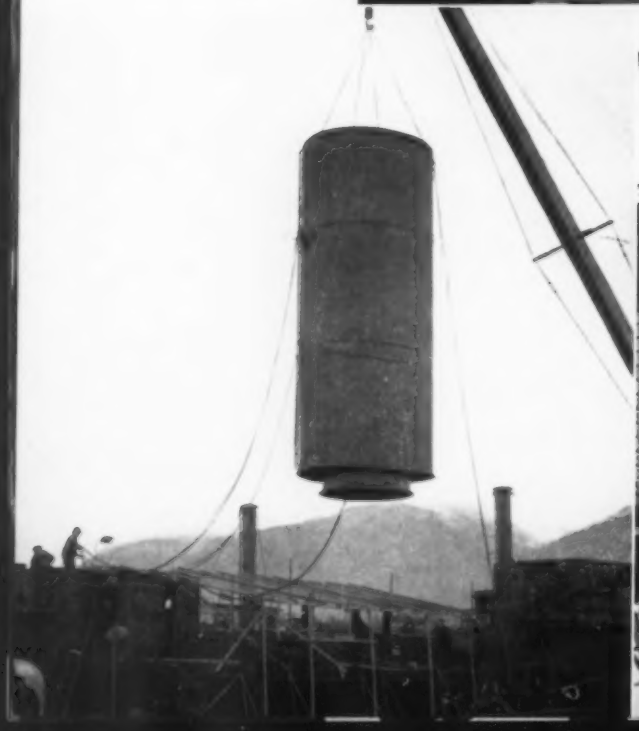
"The Canadian Navy with its destroyers and corvettes is sharing thirty-nine per cent of the burden of convoying ships across the North Atlantic".

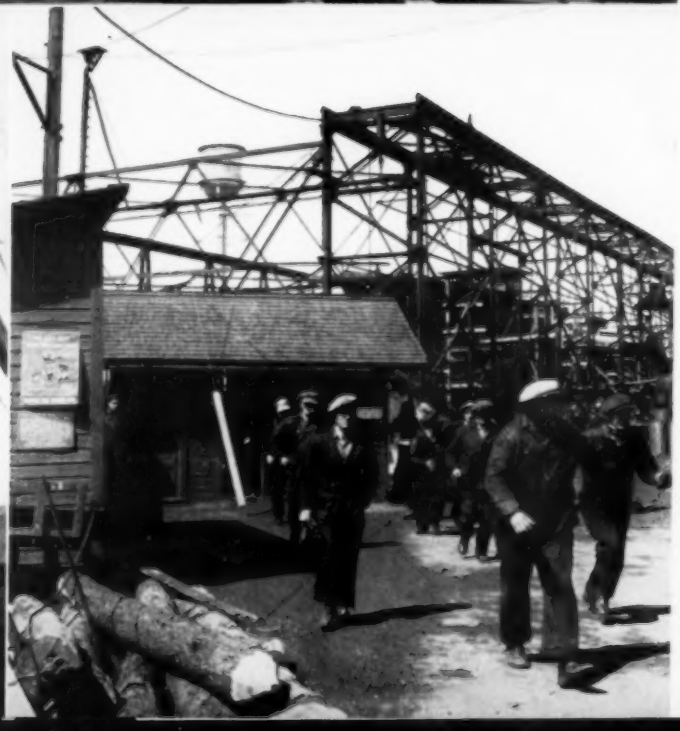
Outfitting a cargo boat is an active time.

Below:—Keel assembly goes forward quickly.

Below:—Pre-fabricated smokestack will fit perfectly.

Bottom right:—Pay day at an Eastern Canadian shipyard.



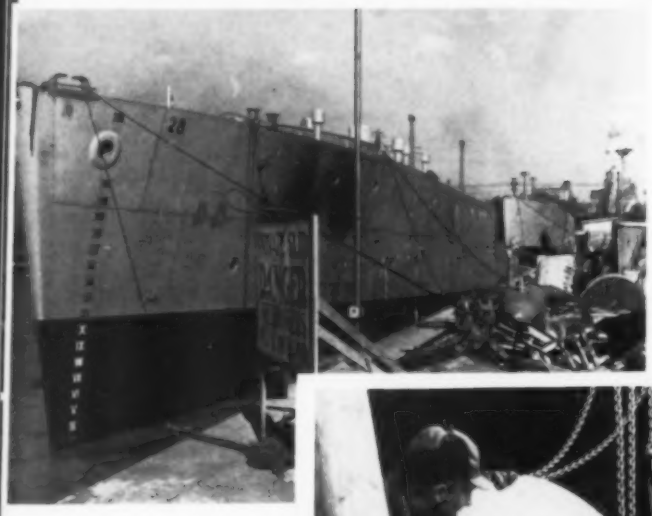


Tightening a porthole fitting. The cover hinged above is called a "dead-light" by sailors.

Below — No sooner is one vessel launched than another is begun.

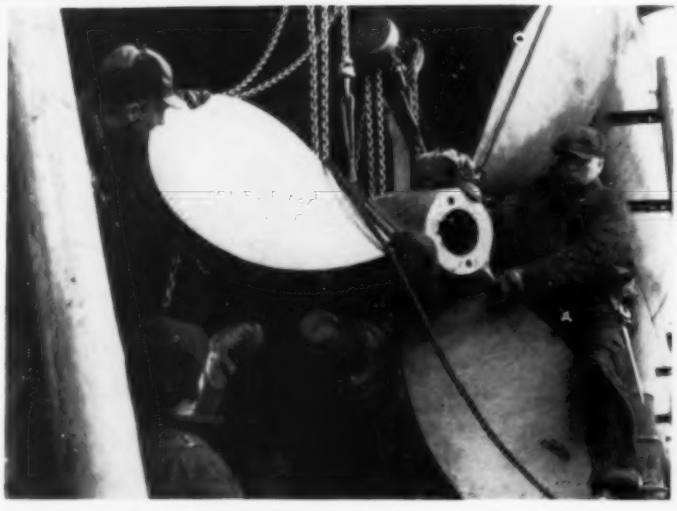
Bottom left:— A stern V frame is lowered into place.

Below:— A ship's bottom frame is silhouetted against the sky.



Top left:—The first step is keel assembly, a delicate operation.

Left: — Launching is over; now comes installation of machinery.



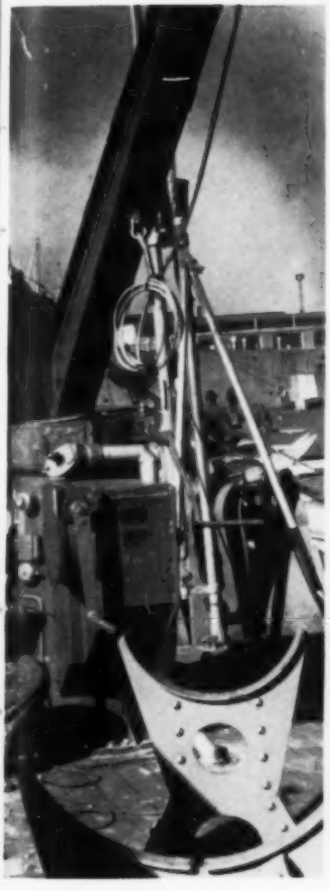
Right: — The propellor is actually a thing of beautiful lines and colour. Fitting it requires skill.

CANADA BRIDGES THE W O

Top centre:—The hull is complete, and soon will slip gracefully into the fitting basin.

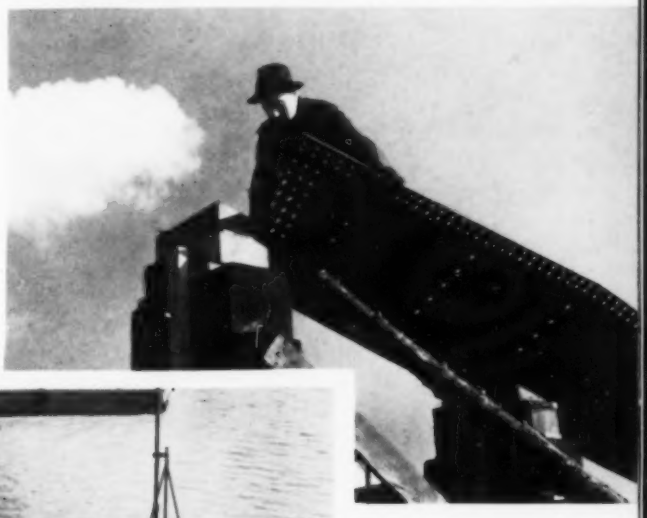
Centre:—Close-up of workman fitting deck gear. In the background a ship nears completion.

Photos by Photographic Arts



Top right: — Shipbuilders stream across a temporary walk to work.

Right: — Careful inspection ensures the accuracy of keel assembly.

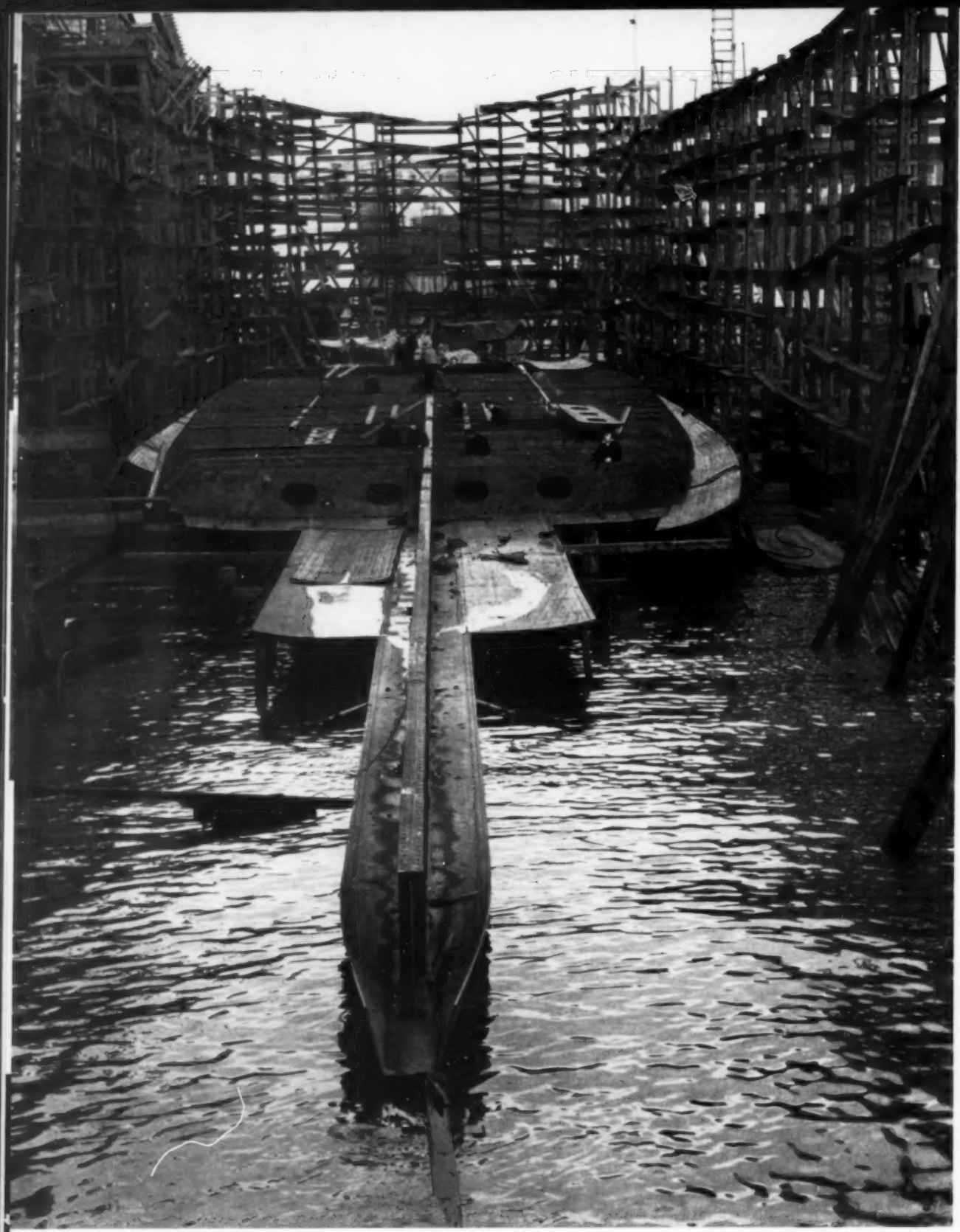


Left: — Workmen swarm over ships in the fitting basins, bolting and welding winches and deck machinery.

W ORLD'S SEAS—WITH SHIPS

Left:—Giant rollers curve a plate for a ship's hull, as easily as ironing a tablecloth.

Right:—Making wooden templates in a mould loft, which is really "spacious as a ballroom."



The giant keel assembly of a 10,000-ton cargo vessel takes shape at a West Coast shipyard.

More than 40,000 workers are busy building ships for Canada's Navy and Canada's Merchant Marine.

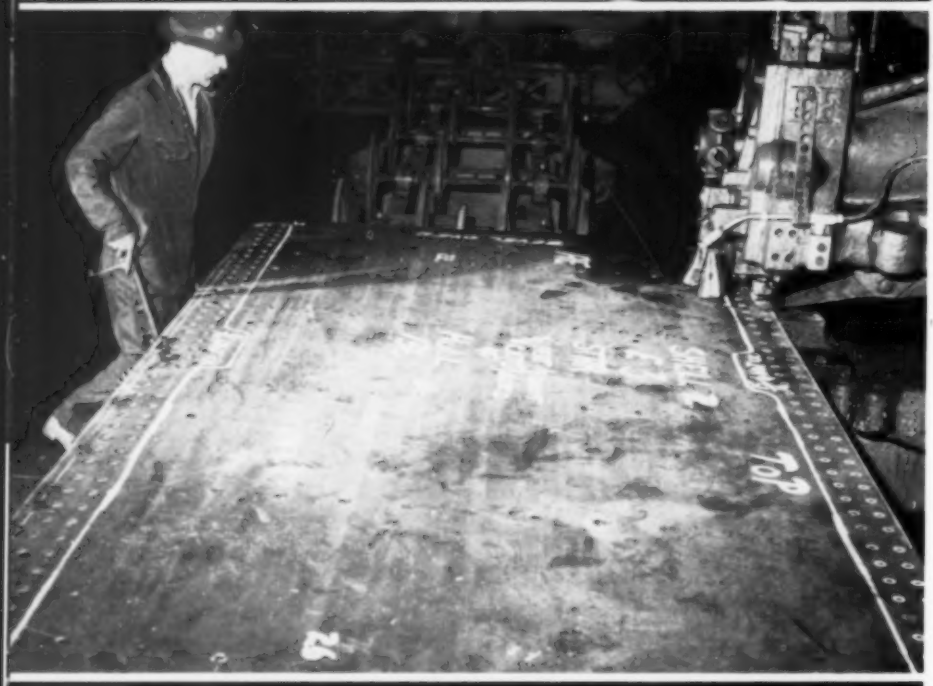
Canadian Cargo Boats To Bridge The Atlantic

by Charles Clay

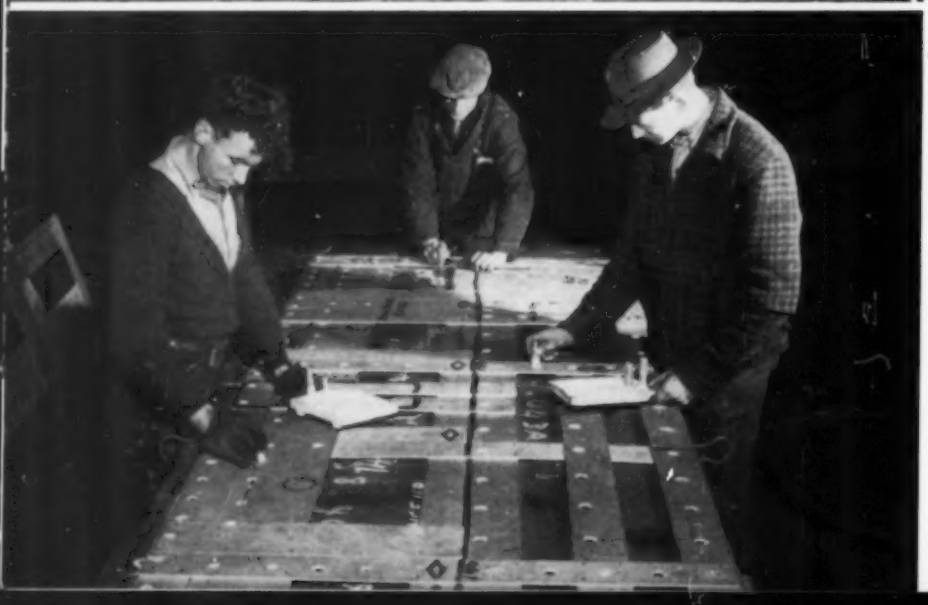
IF you want your breath taken away by a few startling statistics about Canada's shipbuilding programme, here are some of the requirements for the 154 cargo boats now on order. If all of their anchor chains could be strung out end to end they would stretch 41 miles. The total weight of these anchor chains would be almost 15,500 tons. Is not the amount of steel required for anchor chains alone quite fantastic? Besides these, it will be necessary to make 36 miles of five-inch wire rope for the cargo boats. They will need 1,683 winches, 1,530 derricks, 4,590 blocks for the derricks. Each vessel will have its complement of life-saving craft; that will mean 153 motor boats, 1059 life boats, 612 life rafts. In addition Canada has some 300 other steel naval craft on order, besides the cargo boats scheduled for production in 1942; and 925 patrol boats and smaller craft, mostly of wooden construction, are also on shipways or in blueprints. It is a major engineering feat.

The programme falls roughly into four parts. The most expensive part is the construction of 154 cargo boats of 10,000 dead-weight tons each, and 18 cargo boats of 5,000 dead-weight tons each, totalling over $275,000,000. The second most expensive part is the addition of vessels, from destroyers and corvettes to minesweepers and subchasers, to the Royal Canadian Navy, totalling something like $187,000,000.

The wooden patterns (templates) are laid out on the floor of the pattern loft.



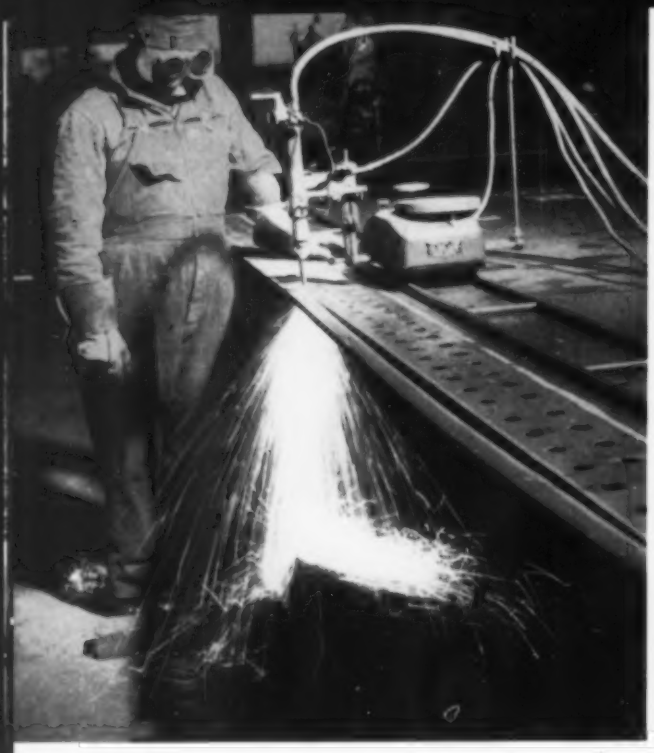
A punch press bites out the holes marked by the white paint.



The rivet holes in a template are transferred to a steel plate by white paint.

A reamer bevels the edges of the punched rivet holes.

Riveters fit a bulwark plate.



A special oxygen torch cuts a steel plate to size.

A welter of power lines and air hoses lend mystery.

The third part, the "small boats" programme, is valued at $10,000,000. And, finally, there is the ship-repairs division, which is involving an expenditure of about $7,000,000.

The grand total is slightly more than the proverbial king's ransom! Shipbuilding, in fact, is the biggest single war job Canada is undertaking; and Canadians are mighty proud of this contribution their country is making to the United Nations' fight against international gangsterism.

In another place in this issue of the *Canadian Geographical Journal*, there is an exposition by Mr. Desmond Clarke, Director General of the Shipbuilding Branch, Department of Munitions and Supply, on the Naval Construction and the Small Boats divisions of Canada's shipbuilding programme. The following pages are designed to present some information about the Cargo Boat and the Ship-Repairs divisions of the programme.

Cargo Boats

The Cargo Boat division is the responsibility of Wartime Merchant Shipping Limited. This Government-owned company handling construction for British and Canadian account was incorporated in April, 1941, just a year ago, to administer the complex set-up necessary. Twelve shipyards are now engaged in carrying out the project. H. R. MacMillan is president of Wartime Merchant Shipping Limited. His experience, as president of the Canadian Transport Company and of the H. R. MacMillan Export Company of Vancouver, has been invaluable in the operation of the organization.

Two-thirds of Canada's big new 10,000-ton cargo boats are being made in ice-free Pacific ports; the remainder are being made on the St. Lawrence. Designed at Sunderland, England, and popularly known as the "North Sands" type, they are considered ideal cargo vessels for wartime. Generally described as 9,300-ton ships, their dead-weight carrying capacity in actual service is 10,000 tons — which includes cargo, stores, water and bunkers. They are non-complex, coal-burning, powered with Scotch marine boilers and triple expansion reciprocating steam engines.

This simplicity is advantageous not only in the rapidity with which ships can be built, but because of the relatively easy task of training operating crews as compared with that involved in the operation of motor ships or steam turbine vessels. Moreover, coal is more readily available than oil, and steam engines can be more easily and quickly repaired in wartime in all ports than other types of engines.

The eighteen 5,000-ton cargo boats

to be built are called the "William Gray" type, and are equally simple and suited to wartime needs.

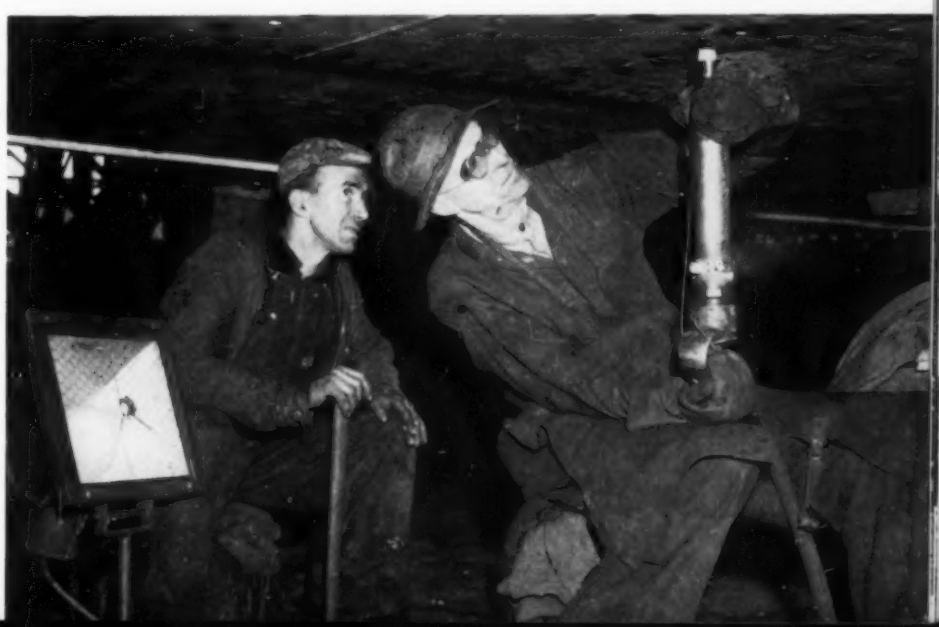
It takes from five to six months from the time a keel assembly is put down until a cargo boat hull can be launched. But long before this, even long before the steel is fabricated at the rolling mill, hundreds of patterns have to be made. Great care is taken with this work, because each wood pattern makes a steel plate and those plates must fit precisely. Pattern-making, in fact, is one of the most mysterious operations of shipbuilding. The pattern, or mold, loft is usually the very top floor of a vast building whose ground floor is used for machine shops, or even for the actual drilling and building of plates and girders.

The floor of a pattern loft is as spacious as a ballroom. It is many feet wide and scores of feet long. It is carefully marked off in lines running its length and breadth, and in diagonals as well as curves. Only the experts know exactly what these are for, but in some manner it is possible to arrange boards on this floor in such a way that they actually simulate any part of the hull, or any of the decks of a ship. The making of these patterns is not done to scale. It is done to actual size. A great section of the side of a cargo giant can be copied and the plates necessary to build that section can be exactly duplicated.

When the steel plates have been marked from the wooden patterns, they are carried to a punching press which makes the holes through which the rivets will pass. The large sheets ride into the jaws of the punch on huge movable tables which enable the plates to run forwards, backwards, and sideways in either direction. A multitude of wheels do this unique operation. The punch bites through the one-half to three-quarter-inch plates with a loud clang, and the ease of a doughnut cutter. The succeeding operation is called reaming. A special machine on two wheels is run over the plates, and the punch holes are bevelled so that the rivets will "seat" neatly.

When the steel plates are being designed from the templates, it is necessary to record on them their exact station, and the duty they must do, in the construction of the hull. This is done by marking upon them in white paint. Cryptic instructions, numbers, letters, engineering symbols, mysterious abbreviations, tell the workmen the precise position of the individual parts. There is no confusion, no delay, no mistakes. It is quite inspiring to think that a man who designed, cut, and marked a steel plate will never see it swing into place, and yet when it does swing into place, it will fit as if he had been right there and shaped it by hand.

The first metal job in building a cargo boat is to lay the keel. Keel assembly is a difficult and onerous task. But it is the foundation of the ship, and must be strong and resilient. It must withstand the swell of the Atlantic while it is carrying precious cargo to England. An intricate maze of steel girders, bolted and welded into position, is the basis of the keel assembly. Huge metal plates are first laid on the shipways. Upon these plates go dozens of keel frames. Each one is from fifteen to



It is so dark beneath the steel giants that workers require special lights, even on bright days.

H. R. MacMillan, President of Wartime Merchant Shipping Limited.

twenty feet long, and of heavy duty steel. When these frames are lowered in, on their edge, they are about four feet apart. A workman standing between two frames needs only to bend slightly to rest his elbow upon their upturned edges. This gives an indication of the tremendous complexity, weight of steel necessary, and ingenuity required, to plan and build a keel assembly. Seen from above, in process of fabrication, and before the superstructure has gone on, a keel assembly looks like a gigantic waffle iron.

As soon as the ribs of the hull are in position, it is possible to lower the steel plates into place. Giant electric cranes do this job. They hold the plates until special boltmen have bolted them where they must ultimately be riveted. Once in position, the riveters swarm into action and the air reverberates with their noisy pneumatic hammers. The hull of one of these new freighters is like a great steel box, with heavy steel walls dividing it into sections. It literally provides thousands of cubic feet of cargo space. The various sections are divided into holds in such a way that there is easy access for quick loading and unloading.

This feature of a 10,000 tonner means that wartime shipping is speeded up because time can be saved at each end of the great Atlantic bridge. It also means that when the war is over, these cargo boats will be able to run on freight lines at a minimum of operational expense. Ease and speed of handling freight will mean more trips, and more trips will mean reduced rates.

The uninitiated visitor to a shipyard is usually amazed — and dazed — by the sights and sounds. But though the confusion and noise in the hull of a cargo ship are colourful and vivid, they are more apparent than real. Out of the welter of electric power lines, air hoses, gas lines, rise the solid and dignified lines of the ship. Every workman has his job, every workman knows his job, every workman does his job. If there ever was an example of industrial team work, it is in shipbuilding.

Contrary to the general opinion, ships are not launched from the docks on which they are built. When a ship comes under construction the keel blocks are laid and the keel plates are assembled on them. Each block must be placed in position with meticulous care, or the entire ship will be thrown out of line. As the construction progresses and the keel widens outwards, additional blocks are laid in place. In this manner, the bottom of the ship is solidly based on heavy wooden blocks which will eventually support the entire weight of the hull. After the keel frames are in position and the plate hangers have started on the shell plates, heavy timber shores are put against the growing hull to keep it upright. At launching, all this superstructure is taken away, and the hull is raised by means of wooden wedges. Special greased ways are inserted under the hull and these carry the ship to the water.

To speed up Canada's cargo boat programme, hulls are launched at the earliest possible moment, and thus, in most of Canada's shipyards, may be found vessels in all stages of production, from keels newly laid to cargo vessels almost ready to put to sea. After a ship is launched, it usually takes from two to three months to complete the fitting.

Curiously enough, except for special constables patrolling the shipyard area, there is little appearance of war in Canadian shipyards building cargo vessels for the Atlantic bridge. But the eye of the skilled observer can find indications of the jobs these ships must do. Special light-tight covers have been fitted to portholes. Three crow's-nests have been made a-top the three stub masts, and from these sailors will sight marauding submarines. There are ominous clear spaces fore and aft — for guns; and high up on the superstructure are indications that molesting aeroplanes will not go unchallenged.

These are chapters in the construction story of Canada's new 10,000 tonners, of which *SS Ville-Marie* was the first to be launched, from a Montreal shipyard.

It takes 2,800 tons of steel to build the hull of such a ship, for it is no row boat. Each is, in fact, 427 feet long, 57 feet wide, and requires 25 feet of water. If all of the 154 ships went to sea bow to stern, they would stretch 12 miles! The Canadian-made power plant of one of these vessels could generate enough electricity to serve a city the size of Medicine Hat. Each boat needs a crew of 40, of whom 20 are in the stokehold. Ten seamen-gunners man its defensive armament.

An indication of the carrying capacity of a 10,000 tonner may be gained from the following. Here is the mixed cargo one ship can carry in one trip, stowed in the various holds and on deck: enough flour, cheese, bacon, ham, canned and dried foods to feed 225,000 persons in Britain for one week; steel and other war metals in slabs and bars amounting to 2,150 tons; enough motorized equipment (Universal carriers, trucks and motorcycles) to equip a full infantry battalion; 1,900 tons of bombs, or enough to load 950 medium bombers for attacks on western Germany, or to load 225 heavy bombers for attacks on Berlin; enough lumber, plywood, wallboard, nails, to build 90 four-room cottages, or a row of dwellings nine blocks long; two complete bombers stowed on the after-deck, and enough aluminum in the holds to build 310 medium bombers or 640 fighters in England.

Of the 172 cargo boats on order over fifty keels have been laid, more than fifteen ships have so far been launched, and some delivered. Work has been progressing all winter on hulls in the dozen shipyards undertaking this part of the shipbuilding programme. With open water there will be an encouraging series of launchings to clear the slips for the laying of more keels in this great undertaking.

Ship Repairs

An important phase of Canada's shipyard activity is repair work. The risks attached to holding ships in the United Kingdom for maintenance or damage repairs may be readily appreciated. Canada was asked to take a greater part in servicing naval and cargo vessels. Development of this wartime project is in the hands of David B. Carswell, Controller of Ship Repairs of the Department of Munitions and Supply. He possesses wide administrative and regulatory powers, with virtually complete control of the Canadian ship repair industry. At his discretion he can fix fees, allocate work, determine priorities, designate the facilities to be employed by any ship requiring repair, redistribute any machines and tools employed by the industry. He is also empowered to take possession of shipbuilding and repairing tools and, subject to Order-in-Council, to acquire and operate any plant.

The purpose behind the appointment of the Controller of Ship Repairs, it has been stated by Munitions Minister Howe, is to assure a maximum utilization of ship repair facilities in order to meet the present and potential wartime needs of Canada and her allies.

Under Mr. Carswell's direction, extensive facilities for ship repairs have been provided at an estimated cost of $5,000,000. A system has been evolved which will permit both naval and cargo vessels operating in the Atlantic, and which have been damaged by enemy action or other cause, to put into Canadian ports for repair. This important innovation not only avoids congestion of United Kingdom repair facilities but precludes the danger of enemy bombing while in port.

The movement of cargo being first consideration, the point of loading is determined by rail and dock facilities at deep water ports. Ship repair services

D. B. Carswell, Controller of Ship Repairs.

Ship repairs is an important part of the programme, especially when the ship is a convoy shepherd, such as this destroyer.

have to be provided, of course, where the cargo is being handled, as ships cannot normally be expected to come to service stations. Therefore, the repair facilities follow the ships and cargo movement.

During the summer and fall of 1941, additional dry docking equipment was rushed ahead for the past winter season in the Maritimes. This was an unique repair project. The vast floating drydock is valued at more than $2,750,000. It is 600 feet long and 135 feet wide. It has a capacity of 25,000 tons and will take many of the larger ships in the Royal Navy, as well as any ship the Canadian Navy now possesses. The drydock, now in operation, is of the improved type and greatly promotes ship repairs.

Other steps have been taken by Mr. Carswell to increase ship repair facilities. Homes and boarding-houses have been built for men skilled in marine repairs, who were willing to go to the Maritimes. Repair piers have been built of light and inexpensive construction for mooring ships out of the way of the loading berths. Machine shops and boiler shops have been mobilized and greater numbers brought into active marine repair work. Machine tools have been purchased and installed in shops for marine repairs. Floating repair shops have been provided for small, but necessary, jobs.

A staff of competent marine engineers has been organized by the Department of Munitions and Supply and employed to see that the repairs are completed without undue delay. They make sure that repair firms provide their skilled workers with the necessary tools for the work they are called upon to carry out. Foreign ship engineers and ship-owners are encouraged to have necessary repairs made at Canadian ports, rather than hold off, as is the custom in peacetime, until they return to their home port.

Sufficient authority has been given so that any necessary reorganization, or regulation, of the work in shipyards able to carry out repairs may be arranged when

The acetylene torch is a boon to the workman wanting to effect quick repairs. Most of this work is done on the Atlantic coast.

required. Ship repairs have been given priority over new ship construction in Canada. During the summer season when the St. Lawrence is open to navigation, repair equipment in Canada is not seriously tested, except in the case of dry-docks. But during the winter of 1940-41, repair equipment and men were under considerable strain, and certain unavoidable delays were encountered. The objective of the division, to provide an abundance of equipment and men so that delays to ships from lack of repair services may be reduced to a minimum, and also to put Canada in a position for inviting British and other ships to use her facilities and so relieve the British repair plants, has now been adequately achieved.

Army of Workers

All this tremendous activity in cargo boat building and ship repairing was not possible, of course, without a like expansion of employment; approximately 25,000 are now employed in cargo shipbuilding for Wartime Merchant Shipping Limited, while a peak of 40,000 will probably be reached this Spring. In addition, the number of men employed in the manufacture of ship components is about equal to that employed in the shipyards themselves.

More men are employed in Canada's shipbuilding industry, to-day, than ever before. They represent nearly 50 occupations, as listed in 1940 by Canada's National Registration Bureau. They are: anglesmiths, blacksmiths, boilermakers, burners (acetylene), caulkers (wood), caulkers (steel), chippers, coppersmiths, draughtsmen (ship) (marine engine), drillers, engineers (hoisting), electricians, fitters (machine), flangers, frame benders and slab men, holders-on, loftsmen, machinists, milling machine men, moulders, iron workers, painters, patternmakers, platers, plumbers and pipe fitters, punch and shear, reamers and countersinkers, riggers, riveters, rivet heaters, rivet holders, shipwrights and joiners, shipsfitters, ships carpenters, sheet metal workers, tappers, tool-

This year Canada will build almost as many cargo boats as the United Kingdom. These photos give an idea of the great cargo space.

makers, welders (electric) and welders (acetylene).

The 3,500 trained ship workers who rejoined the shipyards shortly after the outbreak of war amount to only five per cent of the total now employed, and a liberal estimate for trained ship workers drawn from other trades would give a total of only seven per cent now employed who have had previous training in shipbuilding.

It is interesting to discover that elderly men, many of whom have been in retirement for a number of years, have returned to their old shipbuilding trades in order to do a war job. These men are caulkers. The decks of the 10,000-ton cargo vessels are of steel, but beneath the steel plates there are layers of wood. It is necessary to caulk these layers of wood with special, tarred fibre. The work is done by these retired men because, for a number of years, no one has been learning this trade and there is now a great scarcity of skilled caulkers.

In the industrial shipbuilding army, women and girls are playing an increasingly important part in handling effectively the lighter mechanical work and so relieving the men for heavier tasks. For example, they make Morse keys and put the fittings for these instruments together. They run engraving machines which word the brass plates describing what the controls do. In one shipyard examined, girls were engaged in such work as painting, riveting, making blackout curtains, making oil coolers, making electrical connections, fitting up electrical control boxes and in some cases, actually making the control boxes. These and numerous other tasks their nimble fingers perform to a high degree of perfection.

Such, then, is the highlighting of the picture of Canadians building their part of the Bridge of Ships across the Atlantic, and helping to keep that Bridge in a state of good repair. It is a job of heroic proportions; and, in the final reckoning after the Victory, their names are going to be placed high up on the scroll. An important job, and an important job well done, will be written into the record.

Wooden Minesweepers under construction in an Eastern shipyard.

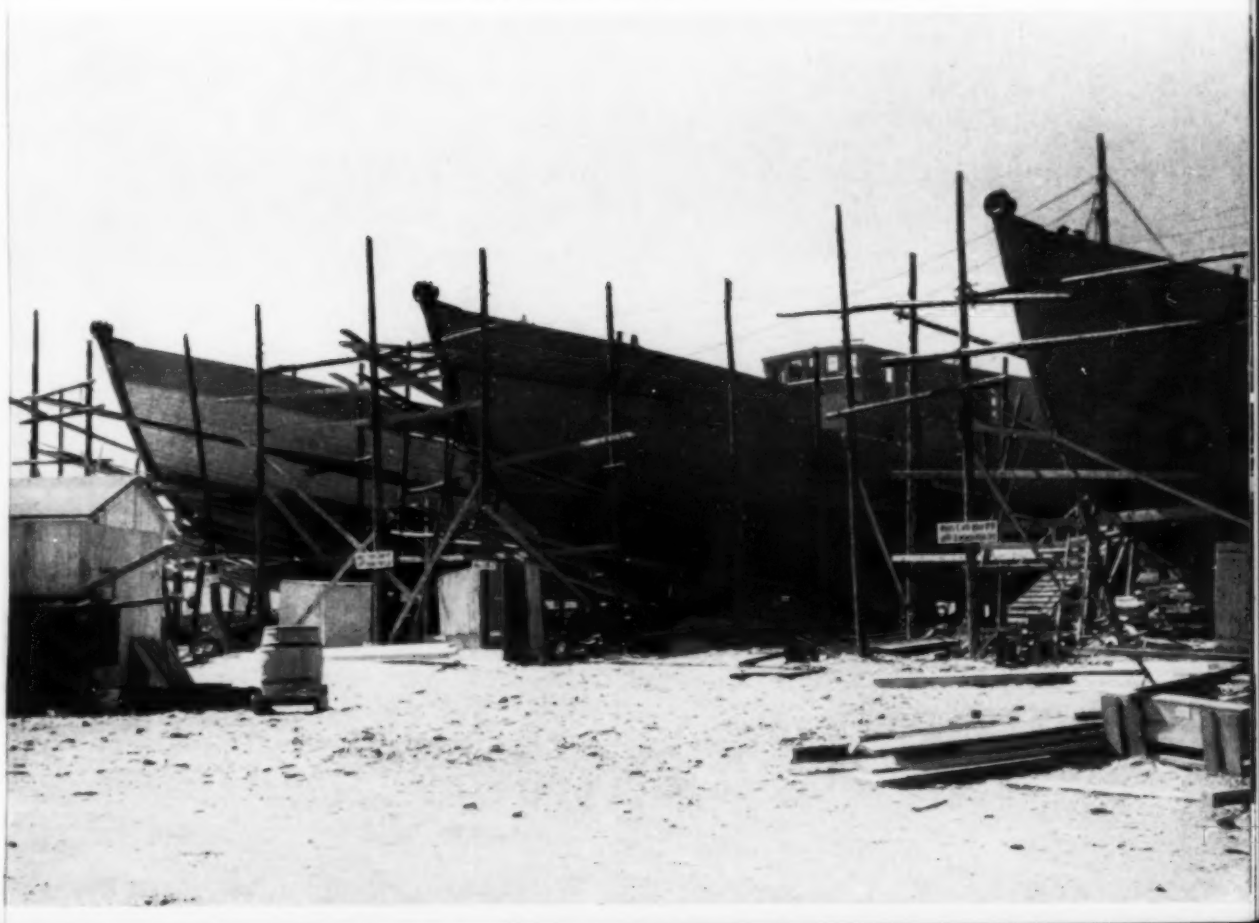


Photo by W. Tansley

Typical waterfront scene, Belem, Para. The small white tower in right centre is the customs house.

Close-up of native sailboats in Belem harbour

Photo by E. M. Flynn

Photo by E. M. Flynn

Farinha, the chief food of the Para labourers, in readiness for shipping. The hampers are made of withes, and covered with broad leaves to keep the grain from escaping. The meal itself is ground from the Cassava root, which is also the source of tapioca.

Some Notes On Belem, Para

by **J. P. NOWLAN***

THREE days from Miami by Pan-American Airways, two weeks or more from New York by steamer, practically unapproachable by other means, lies the unique and interesting city of Belem, capital of the State of Para in Brazil. To be exact, this city is situated on the south side near the mouth of the Para River, which is really a tidal channel reaching to the Amazon, and which carries much of the Amazon flow to the ocean. Short roads and short stretches of railroad lead out of the city to various smaller towns along the coast and up the river on its south side. No lines of communication other than by water or by air connect the city with the outside world, and the State of Para might almost be considered as a separate country, with customs and problems peculiar to itself. For many years, and even yet in general conversation, the area north of the Amazon and now belonging to this state was known as Brazilian Guiana, and the name seems appropriate, for resources and climate are similar to those of the other Guianas. This article is concerned with the comparatively civilized district immediately surrounding the city of Belem.

Three hundred years ago this territory and the city of Belem itself were being vigorously fought for among the Portuguese, French, and Dutch. The Dutch were first eliminated, but as recently as 1901, the ownership of the area was being

Pan-American flying boat, *Brazilian Clipper*, in which our party flew to Brazil. Photo by E. M. Flynn

* Where not otherwise credited, photos by author

disputed by the Brazilians and the French. The matter was referred for arbitration to the President of Switzerland who conceded to the Brazilians the territory as far north as the Oyapock River. This river still marks the boundary between French Guiana and Brazil.

Rich deposits of placer gold had been known to exist in this district for many years, and were indeed the chief reason for the continued disputes over the ownership. At the time of the decision giving Brazil jurisdiction over the area, a French company was busy preparing to exploit the Lorenzo placer fields, a few miles south of the present border. Access to the reports of engineers engaged by this company prompted a Canadian mining company to send a small expedition to this area to examine it. As geologist on this party, the writer had the opportunity of spending three months during the summer of 1935 in travelling through the district and seeing the country in the best possible manner . . . that of living with the natives, in many cases under nearly the same conditions.

The trip from Miami to Belem offers few difficulties with a twice-weekly airway service taking passengers, express, and mail. The time consumed is three days, with flying hours from daylight to dark, and halts for the night at convenient towns along the route which follows the arc of the West Indies. Early afternoon of the third day finds the plane dropping down among the motley fleet of sailboats, lighters, and steamers of all sizes, which fills much of the mile-wide stretch of river opposite Belem.

The writer's first impression of Belem was a distinct feeling of surprise. Instead of a hot and sleepy city, composed of mud huts, with unpaved and dusty streets, were large docks with modern equipment, modern dredges busy in the harbour, paved streets with a volume of street-car and motor traffic only less than in a city of equal size in Canada, courteous and nattily uniformed policemen, and, by no means least, an invariably cool breeze. While to a certain extent the impression of modernity becomes modified, this refreshing breeze always remains, the days not becoming uncomfortably hot, and the nights are always cool.

While in Belem, the Grand Hotel was the headquarters for our party. This is the most modern and expensive hotel in the city, with rates running all the way up to thirty milreis a day for tourists. Prevailing exchange is at the rate of eighteen milreis to the dollar, and the prices at the hotel include three excellent meals a day, so it can hardly be called an extravagant place to live. At present there are no rooms with bath, but each floor is well provided with showers, and each room has running water, neither hot nor cold. Ice water for drinking can always be obtained, however, and in a few days one scarcely misses hot water. Large French windows in the rooms, and very high ceilings contribute to make this a very comfortable place.

Meals are decidedly Brazilian in style. Breakfast, or *café*, normally consisting of crusty buns and coffee, is served in your room. With a little knowledge of Portuguese, fruit of various kinds, jellies or marmalade, and even bacon, can be secured, rounding out a very fair meal. These items add six to ten cents a day to your bill. Lunch, or *almoco* consists of an excellent soup, a variety of local fish, omelettes, tender steaks, and various other kinds of meat. Dessert consists usually of fruit, cheese, and sometimes ice cream. Dinner is a repetition of lunch with possibly more variety.

The bar-room and sidewalk café of this hotel are the favourite meeting places of the town's society. Here tables and chairs for perhaps two hundred people

are always available, and you may linger all day, enjoying the shade of the huge mangoes lining the sidewalk and watching the varied life of the city pass. No obligation exists to purchase anything, although a waiter always hovers respectfully in the background.

Along the sidewalk streams a motley and varied assortment of peoples — groups of schoolgirls in trim uniforms; newsboys calling their wares; small dirty-faced urchins with cheerful grins urging you to buy lottery tickets; bootblacks; guides; workmen, and well-dressed business men. In the street passes a steady procession of street-cars, automobiles, pushcarts loaded with goods for delivery, and carriers with all types of wares on their heads from grain to coffins. Every half-hour or less a loud siren is heard accompanied by a clamorous bell ringing . . just the ambulance dashing by.

The story of these ambulances is quite interesting. It seems that the previous government, having a little extra money on its hands, purchased several modern ambulances, and passed a law that in case of accident or illness in a public place, no bystander could assist the victim, but all attention must be withheld, awaiting the arrival of the ambulance. Violation of the law results in the helpful one being liable for all hospital bills or other expenses. There being too few accidents to keep the vehicles busy, they are now popular among officials who wish to move from point to point.

Opposite the hotel is a large opera house, relic of the rubber boom, and now rarely used. The interior of this building is really lovely, and the seating capacity is easily several thousand. At present entertainment in the city is supplied by half a dozen movies, and by club life. Clubs of all sorts abound, ranging from high-class gambling spots to a rowing club. A miserable golf course exists, patronized chiefly by a few hardy English inhabitants, and there are a few good tennis courts. Soccer, rowing, volley ball, and tennis seem the most popular sports. There are no swimming pools in the city.

The high-grade shopping district offers little uniqueness except the narrowness of the principal street. Until recently, American, German, and English goods competed for first place with an assortment of products of Brazilian industry, these last being mostly of the cheaper grades. Suits, shirts, underwear, etc., are best purchased made to order, and prices are very reasonable. Several shops specialize in Para products, mostly skins — leopard, alligator, frog, and lizard, and wood products. These latter are often very attractive, and some exquisite furniture can be made from the local woods.

For an unusual atmosphere in shopping, the large markets, located close to the waterfront, must be visited. Most outstanding is a meat market, housing fifty or sixty butchers, each standing in his individual stall with a huge set of brass scales, and a hundred kilos or so of meat to sell. The best meat is sold early in the day, and, at 10.00 a.m., a general reduction in price of the unsold portion takes place. Between this hour and noon the poor people flock to buy. At noon all unsold meat is condemned and carted away. During the afternoon a crew of attendants thoroughly hose down the whole building, while buzzards dart around cleaning up

Top:—The Grand Hotel — the sidewalk café at a deserted hour

Right:—Para's most modern buildings on its most imposing street, Praca d'Independencia

any odd scraps overlooked by the cleaners. This meat market is by far the cleanest I have ever seen, with no flies in evidence.

The fish market is run on much the same principle. Fish begin coming in from numerous boats an hour or so before daylight, and every load is carefully inspected by a sanitary official before it can proceed to the market. Flies are again noticeable by their absence.

Numerous other sections of the market exist, devoted to vegetables, nuts, clothing, mats, and other items, all of local manufacture. Great piles of broad rimmed straw hats fill one stall with equally high piles of wooden sandals in the next. Crowds, usually extremely orderly, throng the entire series of markets from daylight until early afternoon. The cleanliness of everything, but not of everybody, is the most surprising feature.

At the section of the dock set aside for them, hundreds of native sailboats are always present. These form the chief means of transport for all the Para-made goods sold in Belem. The sensation of cleanliness disappears when examining these boats.

Modern manufacturing machinery has made little headway in Belem, and probably the people are more contented because of this. Exceptions to this rule are the up-to-date ice factories, but even with these, the nearby sidewalk is covered with boys and men turning ice-cream freezers by hand.

Prices of home manufactured articles are very low to the Canadian mind, although to a workman drawing five milreis a day they would be relatively higher than similar goods in this country. Street-car passage costs 200 reis, or slightly more than one cent; locally made panamas cost eighteen milreis; delicious pineapples cost 300 reis; beer about one milreis a pint, or less depending on the place of purchase; and ice cream anywhere from 600 reis to mil 200 reis, depending again on the variety and location. Shelled fresh brazil nuts in air-tight boxes put up especially for visitors cost six milreis a kilo, or roughly sixteen cents a pound. Oranges and bananas are practically free.

English capital controls the street-car lines and dockyard facilities. Trade unionism has crept into these two industries with the result that stevedores and street railway conductors are paid rather more than usual wages. Paradoxically enough these two groups seem to be the only discontented workers in the district. Pay is low, but nature is bountiful, and anything but a smiling face is a rarity.

Among the striking features and points of interest in the town must be mentioned the Zoological Gardens. These unique gardens are devoted to Amazonian fauna and flora, and contain a truly fine assortment of representative life, ranging through fat and lazy alligators, and crouching pumas to little creatures running around with no restraint, that are like nothing in this country, and resemble a possible cross between a rabbit and a prairie dog. Birds are there in breath-taking variety of size, colour and voice. A well arranged aquarium contains a splendid assortment of tropical fish, and a snake house is rather less well supplied with ophidian specimens. The price of admission is 200 reis a person, almost as good as a free ticket.

The smaller towns in Para are much less progressive than is the chief city. Automobiles are a rarity, streets are only of sun-baked clay, and turn into slippery gumbo when wet, houses are mostly open to the weather on the sides, and are very scantily furnished. A rough table with a few gasoline cases, or possibly, in wealthier houses, a few straight-backed chairs, furnish the living-room. Bedroom furniture consists of two hooks for hammocks, while the kitchen usually boasts a wooden stand on which is built a clay fire foundation. Four pillars of brick or stone above this support a grate for pots and pans. Ovens are almost unknown, but, where they do exist, are made of clay, located in the yard, and raised to permit of firing underneath. Electric lights are present if the town is of any consequence, and a municipal dock and shelter usually exist.

Sailboats are present everywhere along the waterfront in every town. They are built all on one plan, which apparently was handed down from the earliest settlers, and is probably a modification of early Portuguese boats after the ideas of the local Indians. The commonest size is about fifteen tons, thirty feet long with a small cabin aft, and the front part reserved for fish, cattle, or other freight. Square sterns and bows give an appearance of awkwardness, and, while they apparently handle readily, the shape detracts greatly from their speed.

Our plans were originally to travel by steamboat from Belem to Amapa, from

which town a single day's trip in a sailboat would put us in the Calcoene River. The small coasting steamer, *Cassipore*, usually makes a monthly run from Belem as far north as Cayenne and back, with various intermediate ports of call. Unfortunately, it did not run the month in which we needed it, and we were forced to travel the whole distance by sailboat.

For the trip north, we engaged a two-masted schooner, of about twenty-five tons, and known by the name *Correio do Amapa*. Translated, this title means mail-man of Amapa, but the vessel was soon rechristened in our minds, *Snail of Amapa*. It is almost impossible to charter one of these boats outright. There are always friends of the owner that must go and other cargo that must be carried. In this case our supplies, weighing perhaps three tons were loaded, plus several tons consigned to a store owned by the boat owner on the Amapa River. Then the owner decided that he simply must take a few tons of roofing tiles for a friend of his living on the Oyapock River. There was only one extra passenger, however, on the day we set sail from Pinheiro, a point a few miles below Belem on the Para River.

A day's uneventful cruise along the south bank of the river and we anchored for a few hours for the tide to change and permit entry in a narrow channel leading to Vigia, a town some distance off the main river and our first port of call. Early the next morning we drifted into this channel with the tide and anchored. It then appeared that before the craft could be trusted to navigate in the open ocean a new main mast was necessary. Four days of living, partly in Vigia's excuse for an hotel, and partly on board the boat, and the mast was installed.

In the meantime, twenty new passengers had appeared, and it seemed that all must be stowed on board. Thus, pleasantly loaded with approximately thirty-five people, and sleeping room for half that number, we prepared to leave the last vestiges of civilization behind and headed into the open ocean with the outgoing tide.

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(1) Water vendor on the street at Vigia, one of Belem's satellite towns. In Belem itself, a modern water system exists, but the small towns still dispense drinking water in this manner.

(2) Waterfront at Chapeu Varado, the resort town where the *élite* of Belem refresh themselves. This boasts the best sand beach closest to the city.
Photo by W. Tansley

(3) The Para River, three miles below Belem

(4) The Para River, looking over to Marajo Island. Note the uniformly low coast-line

EDITOR'S NOTE-BOOK

Desmond Clarke, Director General of the Shipbuilding Branch, Department of Munitions and Supply, came to this work in June last, well equipped for the task of stepping up production of ships for Canada's Navy. His article, under the title "Canada Builds a Navy", records an achievement of organization, esprit de corps, and hard work, with many thousands of participants working harmoniously for a common end — ships to guard the life line of British, ships to fight the enemy, ships to speed the day of Victory. Mr. Clarke puts the same energy, foresight and enterprise, only more so, into his work as he put into successful ventures in private business; first, in the pulpwood industry, then as founder and President of Clarke Steamship Company, and more recently as President of Quebec Airways. Today, both these services are closely linked with the war services, as two of his ships are in the service of the Government, and the Quebec Airways is serving as a unit of the British Commonwealth Air Training Plan.

Charles Clay, for a number of years Literary Editor of the *Winnipeg Free Press*, is not unknown to the readers of the *Journal*. Articles on Northern Manitoba Indians, life on the Pre-Cambrian Shield, and "color" of the Rocky Mountains, have been written by him for these pages. In December, 1940, Mr. Clay left the employ of the *Free Press* to join the R.C.A.F. but his candidature was unsuccessful. He therefore "set up shop" (his term) as a free lance journalist and publicist in the Nation's Capital, and is doing war work with his pen and typewriter, being denied it with airplane and bomb. During 1941 he wrote many articles — mostly about Canada's war effort — for Canadian and American publications. He is the author of three books, the latest, "So You Want a War Job!", published in January of this year.

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Subjects which will be presented with graphic illustrations and maps during the next six months include;

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FINMARK
MECHANICAL TRANSPORT AND TANKS
HANDICRAFT IN QUEBEC
REPUBLIC OF HONDURAS
THE FAEROE ISLANDS
THE BAHAMAS
CANADA'S FAR NORTHERN TERRITORIES
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IRAQ AND IRAN
THROUGH A QUEENSLAND JUNGLE
GLACIERS
BY LAW — THIS BOUQUET
FUR FARMING IN MANITOBA
LAPLAND

Canadian Red Cross

Gordon Sparling, production supervisor of Associated Screen Studios, Montreal, returned from England with negative of scenes filmed for a Canadian Red Cross picture which will be released in May. Mr. Sparling made the trip to England, leaving shortly after Christmas, to "shoot" scenes of Red Cross activities there, showing the work that is being done with voluntary contribution of Canadian members of the Society. Queen Elizabeth and Anna Neagle are personalities who will create more than ordinary interest in the picture.

AMONGST THE NEW BOOKS

The Lungfish and the Unicorn. An Excursion into Romantic Zoology, by WILLY LEY. (New York; Modern Age books, 1941, $3.50). The saying of Agassiz, "The possibilities of existence run so deeply into the extravagant that there is scarcely any conception too extraordinary for Nature to realize" might well be taken as the motto for Mr. Ley's fascinating book. It would seem to contain all the strange beasts which have existed in the world as well as those that grew from travellers' tales and from the dark recesses of men's imaginations. Our author specialized in the history of zoology and palaeontology and of science in general while studying in German universities, and, since coming to the United States in 1934, has made a name for himself not only for his books but as a very acceptable lecturer and contributor to scientific periodicals. His brief but delightful introductory chapter is a progressive account of the growth of zoological science from Pliny the Elder's Natural History, Gesner's Historia Animalium, the works of Linnaeus, Cuvier, Buffon and others, down to Darwin. But it is not to the main stream of zoological theory and research that this book is devoted, but to the border lines, the vague boundaries of knowledge, the twilight zones, the weird and wonderful discoveries which suggest as an alternative title "Evolution without Tears".

The three main topics are, mythical animals and their possible basis: animals that have become extinct in historical times and ancient types of

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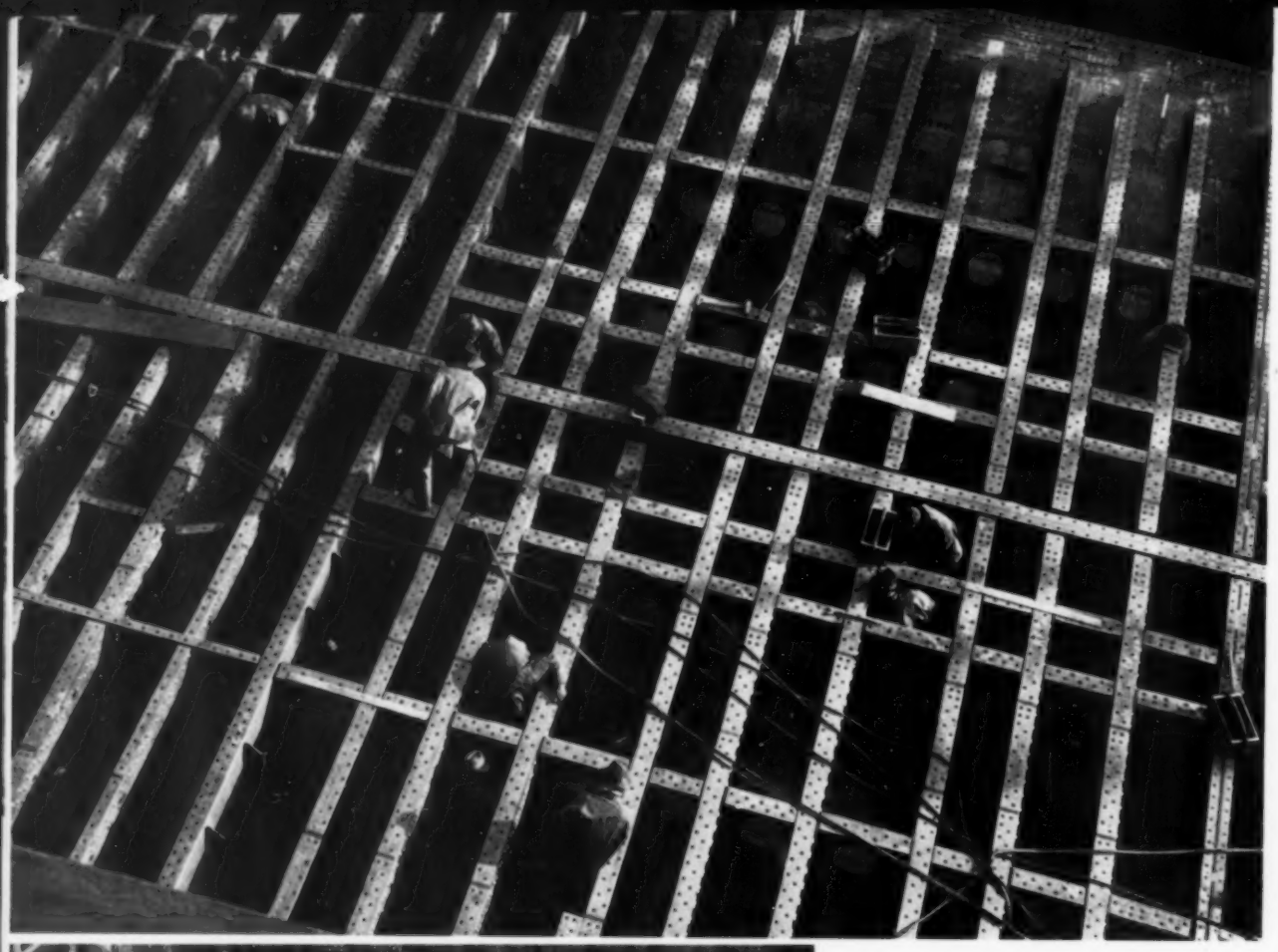
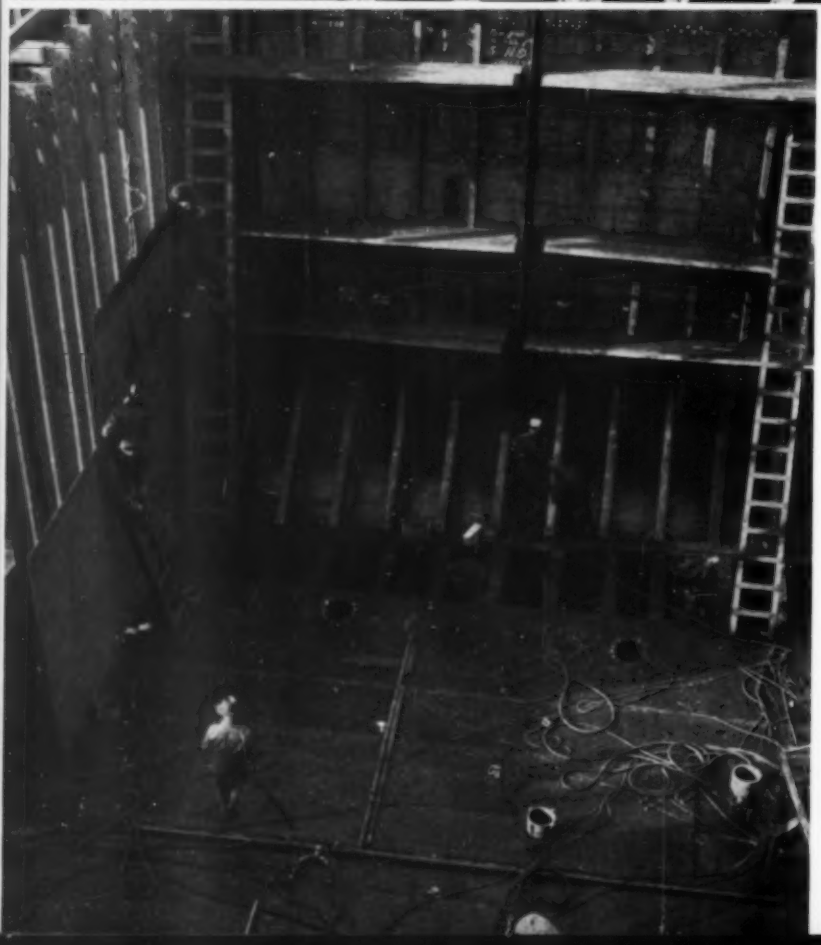
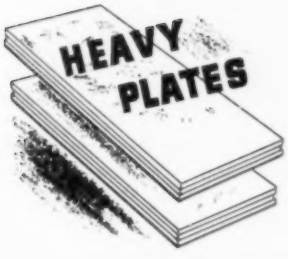


Sturdy and strong are the ships built by Canadians. The camera looks down onto the keel assembly.



The bulkheads go into place in the hull of a great cargo boat.



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animals that have not become extinct. The unicorn, most glorious of mythical creatures has the oldest legend and was the last to disappear. Even in our time, which is not given to mysticism in the realm of natural history, the unicorn has retained much of its charm and glamour, though no one any longer believes in its actual existence. So we have first an alluring history of the unicorn legend and its sources. Here is a typical comment, "The Jews competed with the Arabs in unicorn tales worthy of Baron Munchausen or Paul Bunyan and quoted the Talmud about its size which was so incredible that Noah could not find room for it in the Ark, so that it had to swim for the entire duration of the Flood and could occasionally rest the tip of its horn on the Ark." Equally curious and widespread were the beliefs in giants, dragons, basilisks and other heraldic beasts. The so-called sea-serpents have a chapter to themselves under the title "The Great Unknown of the Seas". Mr. Ley relates many of their "appearances", and, in view of the character of the witnesses, he grants that the authenticity of these creatures is still unsettled. This section ends with the remarkable hypothesis that the Sirrush of ancient Babylon is a dinosaur possibly still surviving in Africa. Not so impossible, since in Africa Sir Harry Johnston discovered the okapi, and as late as 1938 a South African fisherman brought to the New London Museum a living fish, specimen of a group supposedly extinct some sixty million years. This is the famous Latimeria named in honour of the Curator, Miss Latimer, who preserved it for science.

The recently extinct animals include, of course, the Urus, the Wisent (European bison), the Great Auk, the Dodo, the Passenger Pigeon and the Giant Sloth. The disappearance of these animals within the period of recorded history is told in considerable detail as is the amazing success of the attempts made by scientists to bring some of them "back to life". Just as chemists predict the discovery of new elements, so the zoologists and palaeontologists hope to find animals marking intermediate forms in the process of evolution. Their imaginative researches have led many of them far afield and brought exciting discoveries in all corners of the world. Australia and Africa hold out most hope of finding these so-called living fossils. Every one is familiar with the unique animal life of Australia, and Mr. Ley's claim for the island continent's distinction as "the zoological attic of the world" is convincingly substantiated in chapters on the Platypus, the Echidna and the Lungfish.

There is a wealth of accurate scientific knowledge in the book, most attractively presented, and illustrated by drawings and quaint prints from old natural histories. Romantic zoology indeed, when the finding in 1915 of a single unusual feather in a Congo head-dress led an American Museum officer after long search and comparison, to the discovery, in 1937, of the Congo peacock, in its Central Africa habitat — and the passage in zoology books to the effect that "peacocks exist only in south-eastern Asia" had to be deleted.

You are old, Father Lungfish, the Unicorn said,
As he rampantly shifted his gears;
Well, what would you feel like if you still survived
After four hundred millions of years?

FLORENCE E. FORSEY.

Holidaying in Canada on the Ottawa River, by S. RUPERT BROADFOOT, K.C. (Ottawa: 1941, $1.50). With the unselfish purpose of adding to the Queen's Canadian Fund, this well-known Ottawa lawyer has compiled a curious and entertaining collection. There are good stories, letters from the great and near-great, photographs, local histories, patriotic paragraphs and interesting memories of his hosts of friends. These recollections have a strong Scottish flavour, particularly the very complete records of certain churches and the amusing glorification of his favourite game of golf. Other nationalities which have made their contribution to Canadian life are paid generous tribute, and allowed to speak for themselves in letters and addresses.

These themes and his affectionate memories of holidays at Pine Lodge at Bristol on the Ottawa are the inspiration of much of Mr. Broadfoot's own verse. Throughout the book, too, are many well-chosen quotations, ranging from Shakespeare, Burns, Kipling, Lincoln, Samuel Johnson, to John Macrae, and others now living who appeal strongly to Mr. Broadfoot's patriotic spirit. The photographs, especially those of Ottawa and the Royal visit, are interesting and well reproduced. As one reviewer has said, the only thing omitted from the book is the writer's diploma from Osgoode Hall, but there is no doubt that Mr. Broadfoot reveals himself as a most kindly gentleman with high ideals and a "copious spirit of enjoyment", which has won him legions of friends. If every one mentioned in these pages becomes the possessor of the book, a very large sum should accrue to the Queen's Canadian Fund.

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Canadian Geographical Journal

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COMMENTS OF EDUCATIONALISTS

Dr. Griffith Taylor, Head of the Department of Geography, University of Toronto, and President of the Society of American Geographers, appraises the work of the Society. We quote:

"The data in these articles are fundamental in many of our University lectures and labs . . . As regards the industrial articles, I have felt that they form a very useful basis for the Industrial Geography of the Dominion. I know of no other equally valuable source of material which is so get-at-able. I have catalogued all this material for my own use. I propose to exhibit the series of reprints in this connection as a valuable contribution to our geographical data . . . I think the Society deserves credit for its help in promoting research by young graduates."

Toronto, Ontario.

". . . I certainly enjoy the magazine and I hope it continues to flourish."

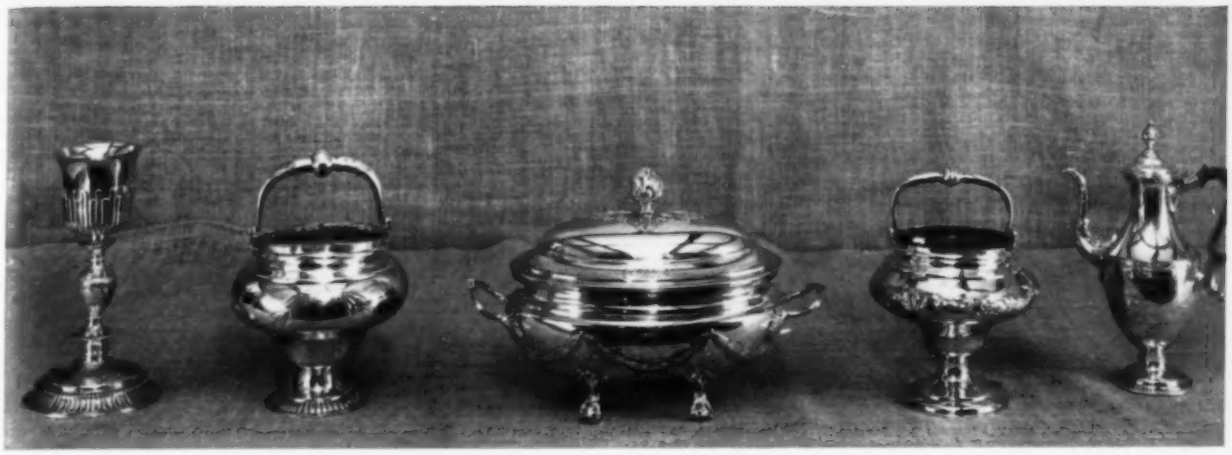
T. W. L. MacDermot, M.A.,
Principal, Upper Canada College.

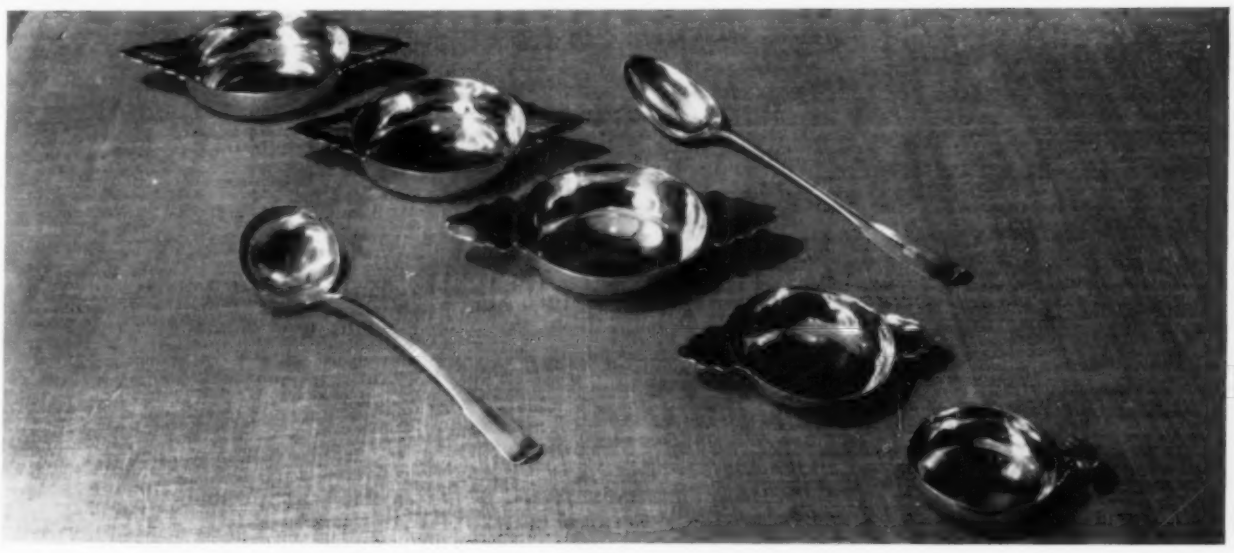
* * *

Cleveland, Ohio.

"I feel that your *Canadian Geographical Journal* is rapidly becoming indispensable to geographers throughout the Americas. I read it from cover to cover and refer students to it frequently."

C. Langdon White, Head of Department of Geology and Geography,
Western Reserve University.





Top:—(From the left)—Chalice by Paul Morand (working dates, 1819-1836)—owner Mrs. F. M. G. Johnson; Holy water pail, Pierre Huguet-Latour, 1749-1817—McCord Museum; Soup tureen, Laurent Amiot (1764-1839)—Mrs. T. Thompson; Holy water pail, Salomon Marion (working dates, 1816-1832); Coffee pot, Laurent Amiot—Mrs. Andrew Allen

Centre:—(From the left)—Censer by François Ranvoyzé—Mr. Henry Birks; censer by Pierre Huguet-Latour—McCord Museum; ciborium by the same; censer by the same—Mr. Paul Gouin; censer by Ranvoyzé—Mrs. F. M. G. Johnson

Above:—(From the top)—Ladle by Laurent Amiot—John Langdon; *écuelles* by Paul Lambert (1691-1749)—Mrs. Basil Hingston; by Roland Paradis (1696-1754)—Mlle Jean Baby; by D (?)—Mrs. Jack Watson; by U. R. (?)—Mrs. Charles Watson; porringer by Jean Amiot (*circa* 17..-18..)—Mr. Cleveland Morgan; large basting spoon by Ignace-François Delezenne, Quebec (1717-1767)—Mlle Baby

Photos by F. J. Topp